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FOREWORD

The *United States Armed Forces Medical Journal* is the medium for disseminating information of administrative and professional interest to all medical personnel of the Department of Defense. The Assistant to the Secretary of Defense (Health and Medical) and the Surgeons General of the several services invite all medical officers, dental officers, Medical Service Corps officers, Nurse Corps officers, and officers of the Veterinary Corps of the Armed Forces, and the medical consultants of the Army, Navy, and Air Force to submit manuscripts for publication in this *Journal.*

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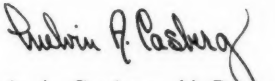
Monthly Message

During a recent visit to overseas medical installations I heard certain criticism of the necessity for standardization of therapy in military medicine. We all recognize that standardization in the application of therapeutic principles is distasteful to most of the medical profession. Nevertheless, there are conditions under which our mortality and morbidity rates may be markedly improved by the application of standard medical procedures.

In the care of combat casualties or those occurring in a civilian catastrophe, a large number of health personnel with a variety of professional competence are required for the treatment of the injured. Therapy initiated at a forward echelon of medical installations is continued along the chain of evacuation with a series of professional men and women each contributing to the eventual recovery of the patient. This situation precludes an infinite latitude in individual therapeutic choice lest the first treatment narrows the limits of ultimate definitive care to the detriment of the patient.

For example, different methods of treating burns are advocated by competent medical authorities, which under controlled environmental situations may yield equally satisfactory results but under the modifying influences of mass casualties and distant evacuation do not all present solutions of equal merit. Though an individual medical officer may be desirous of using a particular therapeutic measure, he must learn to conform to the standards established lest the initial treatment set the course of future definitive care in a pattern unfamiliar to the personnel and unadaptable to the facilities available in the chain of evacuation.

Despite the stringent conditions imposed by combat, our military health personnel have a broad choice in the various types of treatment they may employ. This is reflected in the highly competent manner in which the officers of our medical services are rehabilitating the sick and wounded patients under their care. The standardization of therapeutic procedures in the military services, to the degree necessary, should not limit or handicap any medical officer in the performance of his professional duties.



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INTERMEDIATE TREATMENT OF MAXILLOFACIAL INJURIES

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THE development of modern methods of air evacuation of casualties and the localized nature of the Korean campaign have placed the larger Army hospitals in Japan in a unique position. Although these hospitals compare with the fixed hospitals in the zone of the interior in facilities, specialization of staffs, and safe distance from the combat zone, most United Nations casualties are received within a few days after injury. Open wounds are observed before the granulation stage and fractures are observed while the fragments are still mobile. These factors have permitted the development of intermediate treatment of trauma on a scale not heretofore possible. Service in the largest of these hospitals from August 1950 to February 1953 provided an opportunity for observing and treating a large number of maxillofacial injuries, including 1,000 osseous fractures. Certain observations made and concepts acquired during this period are of general interest.

The necessity for intermediate treatment of the individual patient depends on the nature and degree of the primary treatment previously rendered. Early in the campaign, during the period of the Pusan bridgehead and the months of rapid advance followed by rapid withdrawal, the medical facilities in Korea were primarily concerned with necessary lifesaving measures and with rendering the patients transportable to Japan rather than with definitive treatment. In later months, oral surgeons were placed in most mobile surgical and evacuation hospitals in Korea. In patients with maxillofacial injuries this greatly curtailed the need for primary treatment in Japan. If wounds were properly débrided and closed and fractures reduced in the first 24 hours, the final result, esthetically, functionally, and psychologically, far exceeded any result possible when treatment was delayed. Every effort should be made to continue increasing the facilities for early definitive treatment in the field, but, when circumstances prevent adequate primary treatment,

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a well-planned intermediate program will produce better results than would be obtainable by further delay of definitive treatment until the patient finally reaches the zone of the interior.

WOUND MANAGEMENT

Primary closure

Most authorities prefer conservative débridement of contaminated facial wounds followed by immediate closure to a more radical excision of suspected tissue followed by immobilization of the open wound, which was advisable prior to the advent of modern chemotherapy. When properly repaired in the first 24 hours and supported by adequate chemotherapy, the maxillofacial

Figure 1. Result 10 days after early closure of severe wound of mandible and tongue.

wound usually heals promptly with minimal scarring. Early closure of a severe facial wound greatly improves the patient's morale. If treatment is delayed, the average patient is depressed by the appearance of his facial wound and must undergo painful dressing changes, débridement, and unnatural methods of feeding.

A striking example of the successful primary closure of a severe wound is shown in figure 1. This patient sustained a severe 8- by 13-cm. stellate wound of his right cheek with a similar wound of exit in the left submaxillary area. There was a primary avulsion of the entire body of the mandible and an avulsion of the entire tongue. The hyoid bone was partially avulsed as were most of the suprahyoid structures. Within 6 hours of being wounded, he received a tracheotomy, a supportive gastrostomy, débridement, and repair of the facial wound in a mobile surgical hospital near the front. He arrived in Japan 6 days later in excellent condition. His morale was exceptionally high as compared with other patients received at the same time with

lesser but untreated wounds. By the fourteenth day, his external wounds had healed with minimal scarring.

Although the advantages of an early closure are undeniable, about 30 percent of wounds involving the mouth which had been primarily repaired were seen to break down in whole or in part. The causes of such breakdowns were:

1. *Tight closure of wounds without provision for deep tissue drainage.* The accumulating fluids materially add to the tension on the wound edges, causing necrosis and breakdown.

Figure 2. Breakdown of a wound, initially completely closed, following acute secondary hemorrhage from the external maxillary artery.

2. *Inadequate use of bandage.* Besides immobilization of the wound, a properly applied bandage minimizes the accumulation of edematous fluids which add to tension on the wound edges.

3. *Failure to treat the oral surface of a wound.* The deep tissue and skin of many wounds were properly sutured but the oral mucosa had been left friable and unsutured, permitting intrusion of oral fluids, tongue movements into the open wound, and accumulation of fermenting food debris.

4. *Secondary hemorrhage.* In 4 patients, breakdown of repairs was attributed either to profuse secondary hemorrhage from unligated major blood vessels or as a result of surgical intervention to control hemorrhage. Figure 2 illustrates the breakdown of a wound, initially completely closed, after acute secondary hemorrhage from the external maxillary artery at a point just medial to the mandibular angle. The pulsating stump of the vessel was located in an area seemingly free of gross infection. This hemorrhage was probably due to primary injury to the blood

vessel rather than to secondary infectious erosion. The original control of the hemorrhage may have resulted from primary blood loss coupled with proximal suturing during wound repair rather than control by ligation of the bleeding vessel. If so, such a breakdown could have been prevented by a thorough examination of the wound for vascular injury.

5. *Secondary manipulation of the repaired wound.* Though not a direct result of primary repair, a frequent cause of breakdown was secondary manipulation, usually for reduction of a fracture. Most fractured mandibles associated with infected wounds remained sufficiently mobile for 10 days after injury to permit the use of simple methods of closed reduction. After that period, reduction methods were necessarily more complex. Thus, if a soft tissue wound had been repaired without provisions for fracture reduction, and if the wound had not sufficiently healed within 10 days, a secondary operation to reduce the fracture frequently precipitated a breakdown of the wound repair. This could be prevented by adequate reduction and immobilization at the time of primary wound repair. Such procedures need not be complex. If a fracture is generally alined and moderately immobilized, the receiving surgeon can afford to await wound healing before constructing a definitive fracture fixation gear.

6. *Inadequate chemotherapy.* Though some degree of infection was expected in contaminated wounds, it was often found following wound breakdowns through culture and sensitivity studies that the contaminating micro-organisms were resistent to the antibiotic drug being used.

Hence, the early closure of a contaminated maxillofacial wound is not contraindicated, but the success of such a closure is directly proportional to the attention paid to standard surgical principles of débridement, hemorrhage control, proper suturing, maintenance of drainage, adequate use of bandages, and giving adequate chemotherapy.

Delayed primary and secondary closure

Military conditions do not permit definitive repair of every wounded soldier within 24 hours. The number of patients who arrived in Japan without such treatment was not significant after the early months of the war. Though evacuation methods were generally excellent, none of these patients was received in Japan in the first few hours after being wounded. Thus infection, induration, and necrosis precluded immediate wound closure. The intermediate hospitals were therefore faced with the problem of management of open wounds.

Early primary closure holds infection to a minimum by closing the avenues of contamination, results in minimal scarring and

Figure 3. Picture taken 3 days after wounding showing gangrene and necrosis, loss of tissue, and avulsion of anterior portion of mandible. Figure 4. Same patient 6 days later. Note splint on mandibular stumps.

contracture, improves morale, reduces the need for nursing care and bandaging, and permits early return to a satisfactory method of feeding. To a lesser degree the same advantages follow delayed primary and secondary closures performed at the first opportunity. It was therefore decided that, whenever possible, maxillofacial wounds would be closed without delay, even though many such patients would require months of reconstructive plastic surgery in the zone of the interior.

No complex closure methods, such as pedicle flaps, were attempted. Closure by direct approximation of wound edges, skin graft, or suture of mucosa to skin across a defect generally accomplished the desired result at the intermediate stage. Illustrative types of such closures follow.

1. *Direct closure.* A wound in which much tissue has been avulsed or débrided, if directly closed, will show distortion of the remaining tissue. About the mouth, this can often be minimized by the use of supporting splints which are also useful in fracture management.

Figure 3 shows a patient as received in Japan 3 days after a wound of the chin. Thirty-five percent of the lower lip, much chin tissue, and the anterior portion of the mandible from the left canine to the right premolar area had been primarily avulsed. Necrosis and gas gangrene were present. As soon as possible, the wound was débrided, and impressions for splint construction were obtained. Six days after admission, the wound being essentially cleared of gross infection and induration, the patient was anesthetized and an acrylic splint inserted and wired to the mandibular stumps (fig. 4). The wound edges were then approximated and closed in layers. Intermaxillary elastics between the splint and the maxillary teeth immobilized the mandible and partially immobilized the wound during the healing period. The splint, although adding somewhat to the tension under which the wound was closed, prevented undue distortion of the soft tissues. Fourteen days after admission the sutures had been removed and the patient was ready for further evacuation (fig. 5).

A more striking example of successful delayed closure with the use of a supporting splint to prevent undue distortion is shown in figure 6. The patient sustained an avulsion of the mandible from the right canine to the left mandibular ramus. There was a 50 percent loss of the lower lip, loss of much chin and left cheek tissue, and destruction of the left floor of the mouth. A large cup-shaped splint, extending under the tongue for support and contoured to replace the left cheek, was constructed, wired to the teeth of the right mandibular stump, keyed into position and wired to the teeth of the left maxilla, thus immobi-

lizing the stump in normal position. A groove in the posterior surface of the splint rested over the anterior margin of the left mandibular ramus and prevented displacement of that fragment. The wound was then closed under tension over the splint (fig. 7).

2. *Skin graft closure.* Frequently the primary loss of skin and superficial tissue exceeded the loss of deep tissue and oral mucosa. In such patients, a skin-graft dressing was used to provide the advantages of early wound closure. Such a patient

Figure 5. Same patient (shown in figures 3 and 4) 14 days after admission.

was received after sustaining a wound which involved extensive loss of skin and superficial tissue, but minor loss of deep tissue and minor penetrations into the mouth (fig. 8). In such a patient a skin graft will provide the benefits of early closure while he awaits reconstructive surgery. As in the case of direct closure, the first step consisted of wound débridement and treatment of the mandibular fracture. In most such wounds, if débridement is adequate and no undue tension is created, the oral penetrations may be immediately closed, even in the presence of infection. Thus, in this patient, at the first operation the oral mucosal penetrations were freshened, slightly undermined, and lightly closed. The wound could then be treated as a one-surface superficial wound while being readied for skin graft. The graft was applied on the seventh day after admission. The result, 15 days after admission, is shown in figure 9.

3. *Closure by suture of skin to mucosa.* When much tissue has been avulsed, many of the benefits of wound closure can be obtained, in the weeks preceding reconstructive surgery, by suturing the skin to the mucosa across the defect. Figure 10 shows

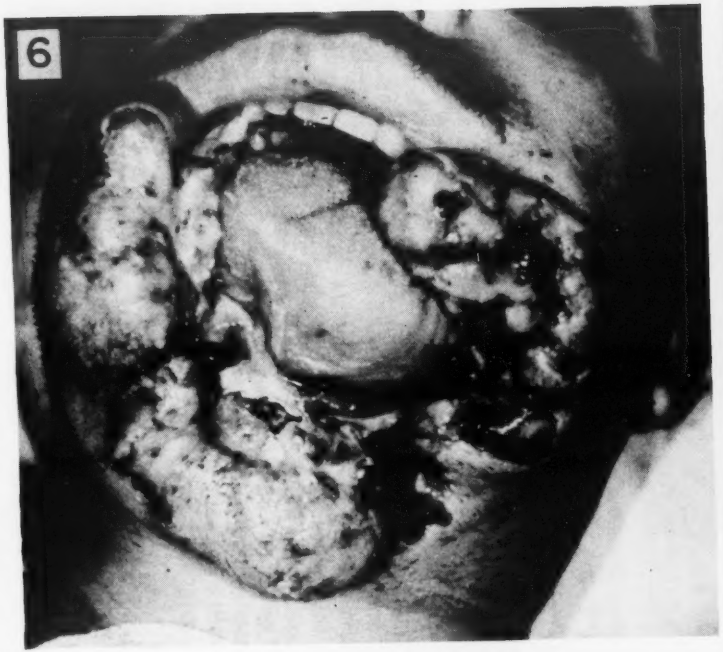

Figure 6. Patient as received in Japan. Figure 7. Same patient 16 days after admission.

Figure 8. Patient as received in Japan. Figure 9. Same patient. Note successful early skin graft.

a patient with loss of more than 50 percent of his lower lip. Direct closure would have necessitated an extensive V-shaped excision of chin tissue. On the other hand, this wound was not ready for plastic closure by a sliding flap. After débridement, the small cheek wound was directly closed and the defect in the lower lip closed by undermining mucosal and skin layers and joining them across the defect. After healing, the patient no longer required nursing care nor presented a feeding problem and he was evacuated to the zone of the interior for reconstruction.

Figure 10. Patient as received.

This method can be used in extensive wounds when little else can be immediately accomplished in definitive treatment. Figure 11 shows a severe maxillofacial wound. The eyes, nose, upper lip, and anterior portion of the mandible were avulsed. The cheeks were destroyed and the maxilla shattered. The patient, though neurologically in good condition, was essentially without means of communication. No closure was possible without prolonged and multiple plastic procedures which could not be accomplished in an overseas theater. A lower splint was constructed and wired to the mandibular stumps, reducing the fragments to normal position. An upper splint immobilized the multiple maxillary fragments into one unit and mechanically closed a large perforation of the palate. The mucosa about the remnants

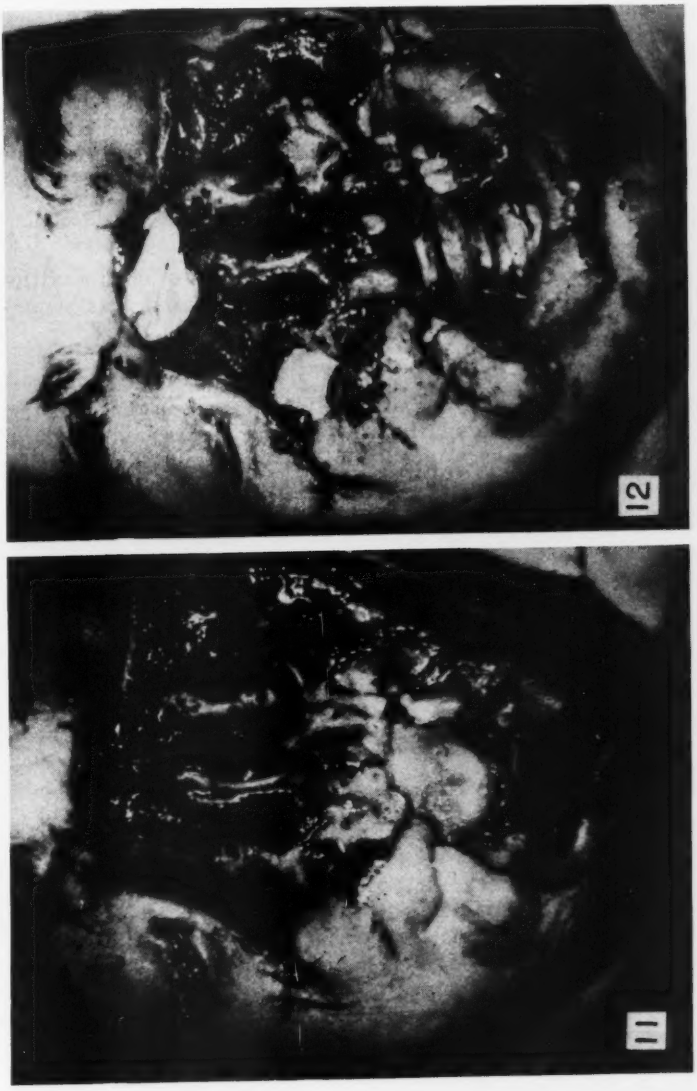

Figure 11. Patient as received. Figure 12. Same patient with acrylic splints.

of the lips and cheeks was sutured to the skin, providing closure of the lower part of the wound (fig. 12). Then, with débridement and packing of the maxillary and frontal sinuses and insertion of plastic tubes into the nasal passages to prevent adhesions, the middle portion of the face was closed by an elastic bandage. If carefully applied, the bandage prevented escape of air except through the mouth and could be used as a makeshift upper lip, thus restoring speech to the patient. The splints provided moderate immobilization of the fractures and partial feeding by mouth was allowed. With these outside contacts restored, the patient's morale was greatly improved.

TREATMENT PROGRAM

Thus, a program for the definitive management of open maxillofacial wounds in an intermediate general hospital was established. The major considerations in such a program are:

Examination and planning the treatment

In order to formulate plans for treating the fracture and closing the wound, the nature of the wound, any associated fracture, and the patient's general condition had to be considered. Other important considerations during this phase included the evaluation of the necessity for joint procedures by various other specialty services and for special supportive measures such as tracheotomy, transfusions, and gastrostomy.

First operation

Primarily designed for wound débridement and fracture stabilization, the first operation was of immediate benefit and was rarely contraindicated by the patient's general condition. It could usually be performed as soon as the examination was completed and the surgical schedule permitted.

Preclosure period.

Prior to the advent of modern chemotherapy, the preclosure period was so prolonged as to preclude definitive treatment of transportable patients in intermediate hospitals and, as much as any other factor, influenced the establishment of specialized treatment centers far from the combat zone. In 1950 it was not unusual to hear older surgeons objecting strongly to programs for early closure of contaminated wounds, stating that such closures could not succeed. The advantages of an early closure are great and, if strict attention is given to certain details, the period necessary for preparing an infected maxillofacial wound for closure would rarely need to exceed 5 to 7 days. Besides the maintenance of adequate drainage, the more important details are:

1. *Adequate use of an effective antibiotic.* Because of the early and liberal use of antibiotics in Korea (usually penicillin and streptomycin), localized rather than generalized infection was the problem in the patients with maxillofacial injuries observed in Japan. Only one patient with severe septicemia was encountered. If, however, the wound remained open, the organisms present in the wound a few days later were rarely found to be sensitive to the antibiotic initially given. Frequent culture and sensitivity tests were required and a change in antibiotic was often indicated.

2. *Continuous wet dressings* were applied locally 24 hours a day. Multiple tests in which some wounds of a patient were treated by wet and others treated by dry dressings proved the efficacy of wet dressings in preparing the wound for closure. Various solutions were used—particularly solutions of salt, acetic acid, terramycin, and bacitracin. Those containing antibiotics were slightly more beneficial. Heat in combination with the wet dressings was found to be beneficial after multiple comparative tests.

3. *Redébridement.* Because conservative débridement is essential in maxillofacial surgery, only the frankly necrotic tissue was removed in the first operation. Thus, in the preclosure period, the wounds were examined daily for further devitalization. Necrotic areas, if present, were locally removed with tissue forceps.

4. *Removal of contaminating and fermenting food debris from the wound.* If the oral involvement was of any import, oral feedings were not allowed. The Levine tube was usually employed. An early gastrostomy was recommended for severely wounded patients.

Closure

Final fracture fixation was completed prior to closure. The degree of success in the closure depended on the attention paid to standard principles of surgery.

Postclosure period

Re-evaluation of the antibiotic program and attention to the bandage were important in this period. It was generally found that the wound had sufficiently healed to obviate the necessity for daily supervision within 8 days, and the patient could then be scheduled for further evacuation if indicated. Thus, with a preclosure period of about 6 days and a postclosure period of about 8, most patients need not spend more than 2 weeks in an intermediate center.

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Supportive and other measures required

1. *Adequate chemotherapy* is important.

2. *Tracheotomy* has been liberally employed in the Korean campaign, 119 tracheotomies having been performed in patients with maxillofacial injuries. Of these, 113 had been performed in Korea and 6 were necessary after arrival of the patients in Japan. Many other tracheotomies were observed in patients not under control of the oral surgery section. Of the various measures used, this was the subject of the most controversy in correspondence with observers in the zone of the interior. Because of the usefulness of the accessory airway in anesthesia and maxillofacial repair, some thought that if the tracheotomy had been performed overseas, the tube should be retained until the patient had finally reached a treatment center in the zone of the interior where the receiving surgeon could choose between removal or further use. Others thought that laryngeal reactions sufficiently frequent to justify the removal of the appliance overseas as soon as it was no longer essential to the primary treatment. At least one qualified observer stated that far too many tracheotomies were being performed in patients with fractured jaws.

In Korea, much of the evacuation of casualties from advanced points to evacuation hospitals has been by helicopter. Although the advantages of this rapid means of transportation over difficult terrain is well known, a disadvantage for a patient with a maxillofacial injury is that he is unattended during a critical stage of a wound involving the airway. Accordingly, we believe that the liberal use of tracheotomy as a prophylactic measure under these conditions is justified. As far as could be ascertained, no death has been attributed to this procedure, and no death in air evacuation from Korea has been attributed to asphyxiation—an amazing record and one in which prophylactic tracheotomy has been an important factor.

In the 119 patients observed in Japan, only 2 complications of import were noted. An empyema which was thought to be the result of aspiration of blood and secretions attributable to the tracheotomy developed in 1 patient, but his tracheotomy was an essential requirement rather than a prophylactic measure. In a second patient, a pneumothorax was thought to be due to pleural puncture at the time of tracheotomy. Both patients recovered. Some patients arrived in Japan with moderate embarrassment of respiration due to accumulated secretions plugging or partially plugging the tracheotomy tube. A mechanical suction apparatus should be available on every evacuation aircraft. Increased emphasis, during the training of evacuation personnel, should be placed on the postoperative care of patients with tracheotomies.

The presence of a tracheotomy tube saved the life of at least 2 patients with profuse parapharyngeal hemorrhage in Japan by permitting presurgical control of the hemorrhage through direct pressure. In many other patients tracheotomies have permitted procedures in anesthesia, definitive surgery, and use of an adequate supporting bandage which would otherwise have been impossible.

As regards the retention of the tube after completion of intermediate treatment, the patients were referred to the ear, nose, and throat section and treated on an individual basis. If there was no laryngeal reaction and the patient seemed well adjusted to the appliance and capable of providing his own care, it was retained during further evacuation. If there was evidence of chronic laryngitis or if no early operation in the zone of the interior seemed indicated, the appliance was removed.

3. *Secondary hemorrhage* due to extension of necrosis as a result of infection, or to secondary trauma from metallic or bony spicules induced by manipulation, coughing, swallowing, and the like, was a major problem in 11 patients with maxillofacial injury. Nine of these occurred in the early months of the campaign prior to the establishment of the system of advanced mobile surgical hospitals, and such hemorrhages were probably due to lack of adequate ligation of vessels and débridement of wounds at the primary stage, but, in many penetrating wounds involving the pharynx, adequate surgical access for wound management is technically impossible, and frequently such wounds must heal by secondary granulation.

Because of the 11 hemorrhages, 7 occurred on the twelfth day following injury and all occurred between the ninth and fourteenth days, it became customary in the second week after injury (1) to watch patients with infected wounds near major blood vessels for signs of hemorrhage, (2) to keep equipment for the control of hemorrhage available at the bedside, (3) to retain the tracheotomy appliances, if present, and (4) to postpone evacuation to the zone of the interior during the apparently critical period.

Sometimes in extensive open submandibular wounds, it was noted that sloughing of devitalized tissue had resulted in the wide exposure of major vascular trunks in the base of the wounds. As a prophylactic measure in the early months, such exposed vessels were ligated if the point of exposure was above the carotid bifurcation, but, if such exposure involved the bifurcation or the common carotid artery so as to preclude ligation, such conservative measures as careful débridement, attention to dressings, immobilization of the wound until secondary closure was possible, and prescribing antibiotics locally and systemically

were used. After a series of such wounds, it was noted that no exposed arterial trunk, if initially intact, had secondarily ruptured. Because the conservation of blood, especially in patients with fragmentation of bone, was essential to proper wound management, it was thought that if major exposed arteries could be successfully treated without ligation, minor vessels could be similarly treated. The prophylactic program was therefore altered and all intact arteries in exposed wounds were treated without ligation. No secondary rupture occurred in such vessels.

4. *Nutrition.* The maintenance of nutritional balance in a patient undergoing prolonged maxillofacial treatment required a rigidly supervised program. Because the stay of most patients in an advanced or intermediate hospital was too brief for gross changes from impaired nutrition to become evident, the tendency in the early months of the campaign was to rely on intravenous feedings to provide the necessary fluids during early treatment and to allow a liquid or soft diet as soon as possible. This program was later found to be inadequate and perhaps was accountable for unexplained delays in healing and for the nonunion of fractures.

As in most general hospitals, the dietary service formulated 3 special diets for patients with fractured jaws. These diets were adequate in protein, caloric, vitamin, and mineral content *provided* the entire diet could be assimilated. The diets were prescribed by number, "Number 1" being essentially a liquid diet for patients with recent fracture and intermaxillary ligation, "Number 2" being slightly heavier, and "Number 3" being essentially a soft diet for patients who were permitted mandibular function.

Severely wounded patients or those undergoing definitive oral surgery, however, could not assimilate these diets when taken by mouth. It was considered important in wound management to eliminate the oral intake of food during the preclosure and early postoperative stage. In such patients, a supervised program of tube feeding was maintained. Levine tubes were inserted shortly after admission and retained during the definitive treatment stage. These tube feedings were adequate in nutritive essentials. In most patients, the tubes could be removed and appropriate diets by mouth substituted within 2 weeks.

There was a marked clinical difference between patients so treated and those allowed oral feedings as tolerated, supplemented by intravenous fluids. Physically, the tube-fed patients appeared stronger and showed less weight loss. Locally, their oral wounds were readied for closure earlier and the postoperative healing periods were shorter, possibly explained on a local basis of less salivation, better wound immobilization, absence

of fermenting food debris in the wound, and better retention of bandages. A secondary advantage attained by the use of tubes was the ease of administrating drugs ordinarily given by capsule—a difficult procedure in the nontube-fed patient undergoing treatment for a fractured jaw.

There were, however, disadvantages in the use of tubes. Some complaints were on a psychologic basis which could be minimized by careful explanation of the need for tubes and by allowing ice chips and completely soluble foods, such as cubed sugar, orally. Ulcerations of the posterior pharyngeal wall developed occasionally, particularly if the period of tube feeding exceeded 2 weeks. Plastic tubes were found to be less irritating than rubber.

Maxillofacial wounds with much tissue loss required multiple and prolonged restorative procedures. For such patients, a gastrostomy is the method of choice for food administration. If it is to be used, it should be used early before nutritional imbalance has occurred. It was used in 15 of our patients in Japan, with apparent benefit to each. Four other patients arrived from Korea with gastrostomy tubes in place. The marked benefit derived from such early treatment for the patient illustrated in figure 1 has been noted, but in another patient, the bulb of the tube had collapsed and the tube slipped from the stomach during evacuation. This had been followed by a feeding into the peritoneal cavity with subsequent severe reaction. Thus, in spite of the advantages of early gastrostomy, the procedure should not be used at advanced hospitals if the patient cannot be retained for the 4 or 5 days necessary for a tissue tract to form between stomach and abdominal wall.

5. *Anesthesia.* Fortunately no untoward anesthetic mishap was observed in the procedures in this series. The nature of maxillofacial treatment during the operation and during recovery is such that unusual problems of airway maintenance must be considered. The operation itself involves the airway and presents mechanical problems along with problems of the accumulation of blood, pus, foreign bodies, and other debris. The electric cautery, if used, is applied in the same field in which the anesthetic agent is usually administered. A smooth, rapid induction of anesthesia and a postanesthetic period free of nausea and vomiting with its attendant danger of aspiration is more important than usual, especially in patients who require intermaxillary ligation during the recovery period.

For these reasons, endotracheal intubation is essential and thiopental sodium intravenously in conjunction with the endotracheal administration of nitrous oxide and oxygen has proved to be an excellent anesthetic agent.

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The intubation should be preceded by topical anesthetization of the larynx in order to minimize the danger of laryngospasm as well as to permit the blind nasal intubation of the patient without the attendant distortion of fragmented bone or damage to complex fracture reduction gear by the use of a laryngoscope. The transtracheal injection of 4 percent cocaine was the method used, and, in a series of 231 maxillofacial patients, as well as 1,410 other patients, no toxic reactions to cocaine were observed. Probably this was because the entire topical dosage of the drug consisted of but 80 mg. (2 cc. of a 4 percent solution) and most of this was coughed away and expectorated.

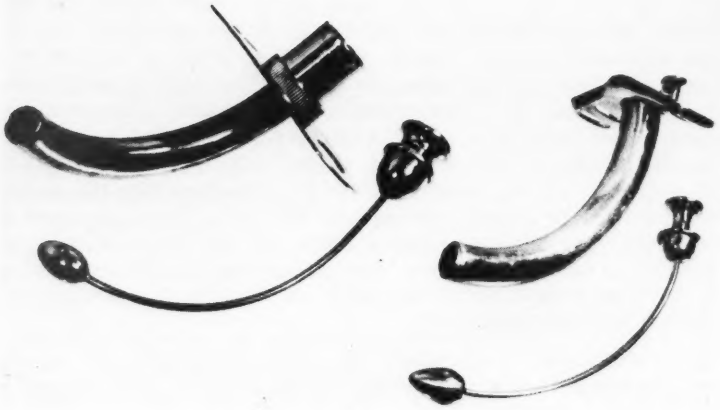

Figure 13. On the right is a standard No. 6 tracheotomy tube. On the left is the corresponding appliance constructed to attach directly to an anesthesia apparatus.

Prior to operation the anesthesiologist examined the patient himself to visualize the problems of anesthesia and mechanics of surgery. Premedication consisted of 100 mg. of pentobarbital 2 hours prior to induction, followed in 1 hour by a demerol-atropine combination (100 mg. and 0.6 mg., respectively). At operation, just prior to the transfer of the patient from the litter to the operating table, the cocaine solution was injected through the cricothyroid membrane. In from 5 to 10 minutes, the larynx and upper trachea became anesthetized. Slow induction with a 2.5 percent solution of thiopental sodium was then begun with from 2 to 4 cc. being injected at intervals of from 15 to 20 seconds, fol-

lowed by intubation as soon as the patient was asleep. Because such an induction does not depress respiration, the breath sounds serve as a guide in the blind nasal intubation. The anesthesia was then sustained on a 75-25 percent mixture of nitrous oxide and oxygen supplemented by small doses of thiopental as required.

During the operation, the pharynx was closed from the mouth by a wet gauze pack around the tube. The trachea was kept free

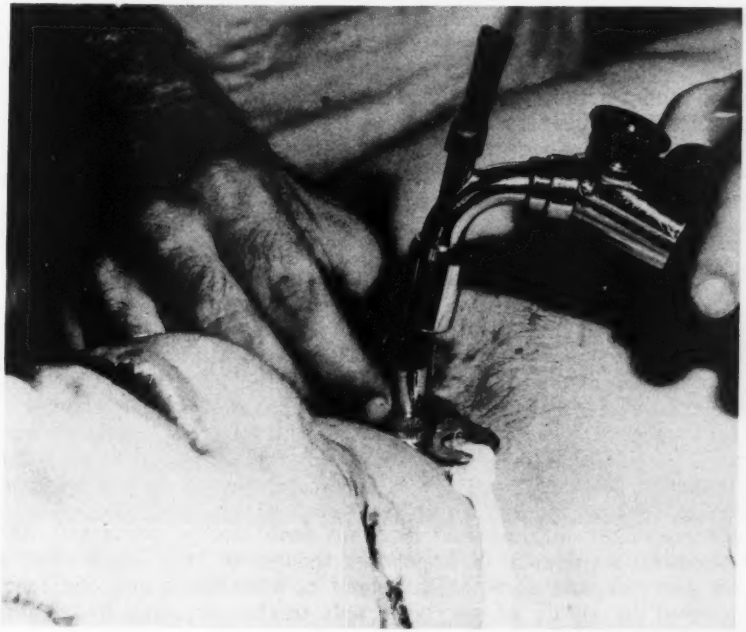

Figure 14. The tracheotomy tube modified for gas anesthesia in use. The connector is fitted with a rubber tip closing an accessory outlet for endotracheal suction.

of secretions by suction through an accessory outlet in the anesthesia apparatus. Removal of the pharyngeal pack and further direct suction to remove all accumulated blood and debris followed the operation. Frequently the jaws were then immobilized by intermaxillary ligation with elastics. In the recovery ward the endotracheal tube was retained, accompanied by frequent suction, until the patient's protective laryngeal and pharyngeal reflexes were completely recovered. The tube was then removed after careful examination for airway patency.

Using such a technic, no laryngospasms were observed and there were no mishaps of asphyxiation during or after the anesthesia. Blind intubation was possible in 90 percent of the patients. Except for a few patients with mild laryngitis, no complications were noted. Intermaxillary ligation gear should not be used during the stage of anesthesia unless a recovery ward is available.

A modification of the above procedure was used in those patients with tracheotomies who thus required no laryngeal cocainization. A great aid to anesthesia in such patients was the use of a modified tracheotomy tube designed to be attached directly to the anesthesia apparatus. Such modified appliances were constructed in the usual sizes of tracheotomy tubes and, during the procedure of anesthesia, the original tube was removed and cleaned while the modified tube was substituted. A No. 6 tube with a corresponding modified appliance is shown in figure 13. Figure 14 shows the appliance in use.

MAXILLOFACIAL FRACTURES

Conservative débridement. There is apparently an unusual capability of maxillofacial tissue to survive severe injury, either because of the rich blood supply derived from the multiple anastomoses of vascular beds, or the relative immunity acquired through years of minor periodontal and paranasal infections. When it became evident that a great many cases were to be observed, an attempt was made to maintain statistical records on the survival of doubtful bone fragments. The intermediate nature of the treatment program precluded a sufficient period of observation in most cases, and the question what should and what should not constitute a "doubtful" fragment could not be accurately determined, but dozens of fragments, thought to have little chance for survival, did show some degree of attachment and could be covered by suture of overlying soft tissue. Of such fragments, many more survived to be of use in fracture union than were lost by later sequestration. In the few sequestrums observed, none were thought to have been attended by any harmful sequela, the fragments either working through overlying tissue or requiring minimal incision for removal and drainage.

It was found that a satisfactory débridement of bone fragments could be attained by flushing the wound several times with a stream of normal saline solution under hand pressure from a bulb syringe. If the fragments were flushed free, it was thought that their removal had been indicated. If the stream failed to dislodge them and they were of any use in fracture management, their retention was justified. Figure 15 shows a severely comminuted fracture in which the small fragments were retained and reduced (without material interference with the remaining blood supply)

by a wire suture passed around an acrylic splint and the fragments. There was much speculation at the time as to the advisability of retention of the fragments. The patient left Japan, but a follow-up report from the zone of the interior indicated that he had been discharged to duty with bony union and without the need for a graft. Treatment for 5 months in the receiving installation had been limited to reconstructive surgery for the accompanying soft tissue wound.

Figure 15. Severely comminuted fracture with retention of fragments and immobilization by splinting.

Acrylic splints. In the series of 1,000 fractures analyzed, most of the commonly described methods for reduction and immobilization were used. Each method has its advantages and disadvantages, indications, and contraindications. All, except the use of splints, are adequately described in standard texts. The acrylic splint is a versatile appliance and, in the primary or intermediate stage of treatment, is often the method of choice in a wide variety of fractures. In the prolonged reconstructive stage of severe injury, where immobilization is of greater concern than reduction, a precision-cast, metallic splint is usually preferable to the acrylic appliance. The acrylic splint can be constructed at most military dental facilities within 24 hours. An important consideration in treating early injuries in the presence of swollen and distorted tissue is that the impressions necessary for obtaining a model of the dental arch need not be as precisely constructed as those for metallic appliances.

The primary indications for the splint are fractures within the dental arch where comminutions, loss of bone, or multiple loss of teeth preclude satisfactory treatment by simple intermaxillary ligation, but the splint can be used in combination with intermaxillary ligation or open reduction methods for fractures near the mandibular angle or distal to the dental arch. When modified by the use of circumferential wires around splint and bone, this technic obviates the necessity for open reduction for displaced fragments, and, because open reduction is not indicated for small fragments or in grossly infected fractures, the splint is almost essential to the management of fractures due to missiles.

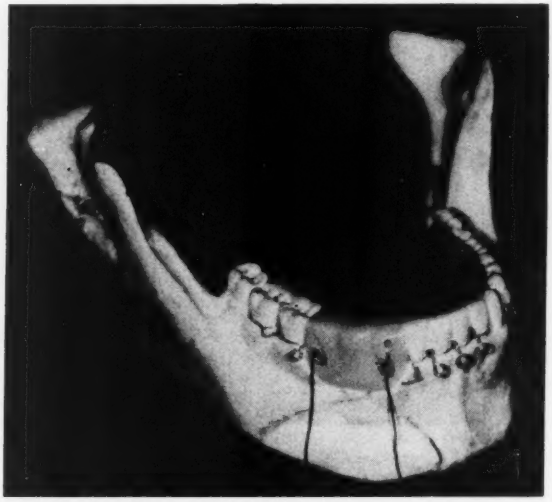

Figure 16. Model of acrylic splint retained by continuous-loop interdental wires.

The type of acrylic splint usually described in publications and used for some years in military hospitals consisted of hinged buccal and lingual flanges gripping the dental arch and retained by a wire tightened around an anterior button. It was inserted over displaced fragments with difficulty, retention was not always adequate and immobilization was usually incomplete. It was found that a splint constructed only against the lingual surface of the arch and tightly retained by wires looped about the cervices of the remaining teeth and through holes prepared through the splint at the interproximal embrasures could be readily inserted. It provided an excellent means of reduction of fragments merely by tightening the wire loops, and offered exceptionally good immobilization. This method was developed in Japan by

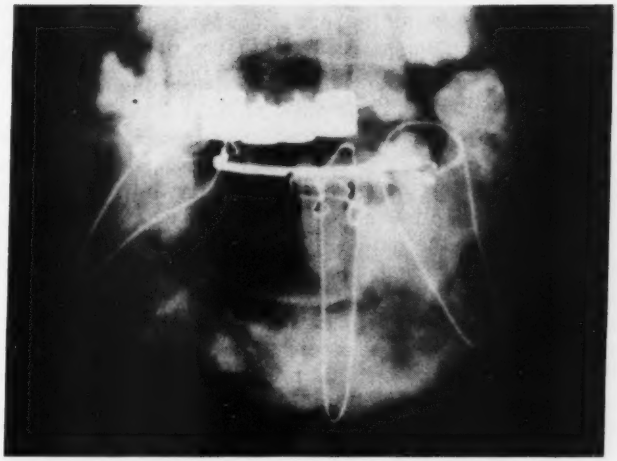

Figure 17. Avulsive fracture of mandible with stumps maintained in normal position by an acrylic splint.

the prosthodontist (3) after his earlier use of a similar appliance in World War II.

Figure 16 shows a model with such a splint retained by continuous-loop interdental wires. Modifying circumferential wires provide reduction for an isolated fragment, and such wires are necessary for splint retention should there be too few remaining teeth. Intermaxillary elastics can be applied if the fracture line is too near the mandibular angle for splinting of the rear fragment.

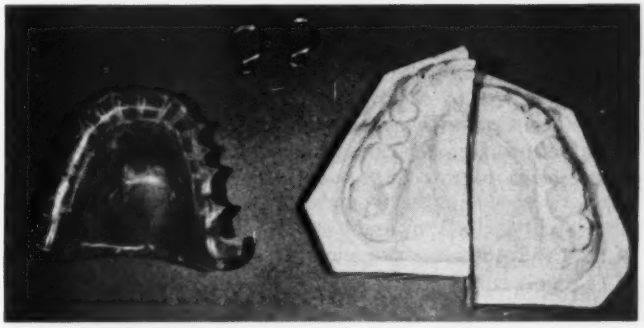

Figure 18. Splint for maxillary fracture.

(3) Lieutenant Colonel James B. Neil, DC, USA.

The splint provides an excellent means for bridging a gap resulting from bone avulsion and, in such cases, can be constructed to provide support for the closure of overlying soft tissue. Figure 17 is a roentgenogram showing the retention of the splint and immobilization of the mandibular stumps.

The splint is useful in treating comminuted fractures of the maxilla. Figure 18 shows a palatal splint constructed to reduce 2 major maxillary fragments by wiring the splint to the teeth. In such a case the splint might also act as a temporary obturator to close a defect in the palate. After attaching wires to the splint bilaterally, passing them between the teeth and through the cheeks to end in fixation to small metallic rings, nearly complete reduction of the entire maxilla can be obtained by elastic traction between the rings and a headcap. Precise reduction can be obtained by the addition of intermaxillary elastics between the fractured maxilla and the mandibular arch *provided* the tendency for downward displacement of the maxilla by such intermaxillary elastics is offset by heavier traction upward to a headcap. This technic therefore provides a means for immobilization of the mandible should it be concomitantly fractured with the maxilla.

Partial analysis of 1,000 fractures. In this series there were 662 fractures of the mandible, 220 of the maxilla, and 118 of the zygoma and zygomatic arch, some being a combination of fractures in the same patient. Zygomatic fractures treated entirely by other services were not included in this series. The relatively high rate of maxillary and zygomatic fractures in comparison with the rate usually reported from nonmilitary installations is probably because penetration by a missile, as likely to occur in one part of the face as another, was the primary cause of fracture.

Of these fractures, 679 were due to missile wounds, 113 to vehicular accidents (ranging from bicycle to aircraft and including occupant and pedestrian), 98 to fights, 44 to blunt instrument blows (including those with definite histories of kicks), 38 to trips and falls, 13 to organized athletics, 11 to blasts and explosions without missile penetration, 2 to pathologic lesions, and 2 to dental extraction. Because some of the vehicular accidents, blunt instrument blows, trips and falls were incurred in combat and some of the missile wounds were the result of accidental discharge, self-infliction, and assault, it is estimated that 70 percent of all the fractures were incurred in combat.

Such variable factors as the degrees of infection, comminution, displacement, the number of remaining teeth, the nature of concomitant injury, and the time and facilities available for treatment enter into the choice of a method for the treatment of mandibular fractures, but the single most important factor determin-

ing the choice is the location of the fracture line or lines. Thus, prediction of percents based on location would be of value in the training of personnel and the allotting of reduction materials. Such studies have appeared in the literature from time to time with sufficient variations to indicate that the results of a great many such studies should be tabulated. For such a purpose, fractures resulting from penetrating missiles are of no particular value because they are as likely to occur at one site as another,

TABLE 1. *Site of 237 mandibular fractures not caused by missiles*

Involvement	Location	Number	Percentage of total (to two decimals)
Single area	Condyle	34	14.37
	Ramus	4	1.68
	Angle	63	26.58
	Body	31	13.08
	Symphysis	25	10.54
Subtotal		157	66.24
Double area	Condyle, bilaterally	3	1.27
	Condyle and ramus	1	.42
	Condyle and angle	6	2.53
	Condyle and body	12	5.06
	Condyle and symphysis	6	2.53
	Ramus and body	4	1.69
	Angles, bilaterally	6	2.53
	Angle and body	25	10.55
	Angle and symphysis	8	3.37
	Body, bilaterally	3	1.27
	Body and symphysis	1	.42
Subtotal		75	31.64
Multiple areas		5	2.11

but in this series there were 237 mandibular fractures attributed to other causes. Considering the condyle to include the neck, the ramus to be the area between the condylar neck and the angle including the coronoid process, the angle to include the area of the third molar, the body to be the area between third molar and canine, and the symphysis to be the anterior portion of the mandible between the canines, the site of the 237 fractures is shown in table 1.

Fractures of the condyle and angle areas most frequently resulted from fist fights and fractures of the symphysis and body areas most frequently resulted from vehicular accidents. About

70 percent of the fractures not caused by missiles were either completely removed from the dental arch or involved only the third molar area. Because such fractures usually are amenable only to open reduction when materially displaced, and usually require some form of intermaxillary ligation for immobilization, the splint is of relatively minor value in comparison with its importance in the management of fractures caused by missiles. The condylar process, singly or in combination with other areas, was involved in 67 cases (28 percent of the total)—an interesting finding in view of the number of articles that have appeared in recent years showing a wide divergence of opinion regarding methods for management of such fractures when materially displaced.

CONCLUSION

Of a large number of patients with maxillofacial injuries, including 1,000 fractures, observed in Tokyo Army Hospital, Japan, some were evacuated no further than Japan, and others had to remain in Japan for varying periods, even though further evacuation was indicated. Except for the prolonged reconstructive surgery required in treating severe injuries, most definitive treatment for maxillofacial injuries can and should be accomplished in the primary or intermediate stages and, if a rigid program of pre- and post-operative ward care is maintained, such treatment can usually be accomplished within 2 weeks. When maxillofacial injuries were adequately treated in the first 24 hours, the results were notably better than those obtained after a delay in adequate definitive treatment.

BOOKS RECEIVED

The Wechsler-Bellevue Scales, A Guide for Counselors, by *C. H. Patterson,* Veterans Administration Center, Fort Snelling, St. Paul, Minn. American Lecture Series, Publication Number 148, A Monograph in The Bannerstone Division of American Lectures in Psychology, edited by *Molly Harrower,* Ph. D., Research and Consulting Psychologist, New York, N. Y. 146 pages. Charles C Thomas, Publisher, Springfield, Ill., 1953. Price $3.75.

The Psychology and Psychotherapy of Otto Rank, An Historical and Comparative Introduction, by *Fay B. Karpf,* Ph. D., Author of American Social Psychology, Its Origins, Development, and European Background, et cetera. 129 pages; illustrated. Philosophical Library, New York, N. Y., publisher, 1953. Price $3.

THE CORNELL INDEX

A Comparison of a Matched Sample of Psychiatric "Suspects" and Nonsuspects (1)

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THIS study undertakes to compare the Cornell Index for a group of 356 naval recruits examined during 1951, who were designated by various psychiatric examiners as psychiatric "suspects," *(4)* with a group of 356 recruits examined psychiatrically at the same time and *not* designated as "suspects." The samples were matched for age and education. The distribution by age and education for the sample of suspects is given in table 1. The sampling of suspects is fairly good, but the sampling of the total population is necessarily poor because those with less education tend more often to be designated as suspects. Thus the results for nonsuspects are of interest only as they are compared with those for the suspects.

THE CORNELL INDEX SCORE AS A SCREENING DEVICE

The Manual for the Cornell Index affirms this instrument's value as a device for screening psychiatric rejects.

> "If a cut-off score of 7 on the *Index* had been used, 86 percent of those rejected at the interview would have been rejected by the *Index*; 28 percent of those accepted at the interview would also have been rejected by the *Index*." *(5)*

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(1) This study was made at the U. S. Naval Training Station, Newport, R. I., in January 1951 when the principal investigator was on reserve training duty. The other investigators were attached to the staff of the Neuropsychiatric Service of the Medical Department of the Training Station. Commander Robert R. Deen, MC, USN, then Chief of the Neuropsychiatric Unit, did the psychiatric examination of the 712 men involved in this study.

(2) Neuropsychiatric Unit, Medical Department, U. S. Naval Training Station, Bainbridge, Md.

(3) U. S. Naval Medical Research Laboratory, U. S. Naval Submarine Base, New London, Conn.

(4) A psychiatric suspect is defined by Commander Robert R. Deen, MC, USN, as "* * * a recruit, who, in a brief psychiatric interview, gives indications of emotional disturbances or personality patterns which might hinder his adjustment to naval service."

(5) Weider, A., et. al.: Manual for the Cornell Index. Psychological Corporation, New York, N. Y., 1948. pp. 3, 6.

No such effectiveness is apparent for the screening of suspects in our study. Table 2 gives the percent of suspects and nonsuspects identified as "rejects" at various cut-off levels of the Cornell Index. If we screen all men with a score of 1 or more, we obtain 75 percent of the suspects and 50 percent of the matched nonsuspects; thus we will fail to identify one-quarter of all suspects while examining one-half of all matched nonsuspects. Placing the screening point higher merely increases the number of suspects not screened without further compensation in the number of errors in designation made.

TABLE 1. *Distribution by age and education for sample of 356 "suspects"*

Education (years)	Age (years)								Total	Median age
	17	18	19	20	21	22	23	28		
6	0	1	1	1	0	0	0	0	3	–
7	2	3	1	3	2	0	0	0	11	19
8	3	5	6	5	5	0	0	1	25	19
9	4	12	9	5	2	0	0	0	32	19
10	9	12	18	15	7	1	0	0	62	19
11	3	10	11	12	6	0	1	0	43	19
12	2	15	45	59	24	2	0	0	147	20
13	0	0	2	10	5	0	0	0	17	20
14	0	0	1	6	2	0	0	0	9	20
15	0	0	0	1	5	0	0	0	6	21
16	0	0	0	0	1	0	0	0	1	–
Total	23	58	94	117	59	3	1	1	356	20
Median*	10	10	12	12	12	–	–	–	12	

*Years of education

At the recommended cut-off level of 7 or above, 17 percent of the suspects and 4 percent of the nonsuspects were screened. Thus we see that the subjects in our "suspect" sample have much lower scores than the Army inductees used in the validation process. Another cut-off point suggested, 13, is even less useful (although it is true that *all* 14 men in our matched samples with a Cornell Index of 14 or above were designated as suspects).

On the other hand, we may establish the significance of the differences between the Index scores of the suspect group and the matched nonsuspect group. The distribution of the differences between each matched pair is given in table 3. A *t* test

performed on this data shows the average difference of 2.16 to be highly significant (t - 8.09), but 78 pairs, or nearly one-quarter, presented a higher score for the nonsuspect, and only 57 percent of the pairs showed a higher score for the suspect. Table 4 shows the score at each quartile for the suspect and nonsuspect groups. The median difference between pairs is +1.05 and only slightly more than one-quarter of the pairs have a difference of over +4.

TABLE 2. *Percent of suspects and nonsuspects screened at various cut-off levels of the Cornell Index*

Cut-off level*	Suspects	Nonsuspects
0	100	100
1	75	50
2	58	30
3	45	20
4	36	13
5	29	10
6	22	5
7	17	4
8	14	3
9	11	2
10	9	2
11	7	1
12	5	1
13	5	0
14	4	0
15	3	0
16	3	0
17	2	0
18	2	0

*Everyone with a score equal to or above the cut-off level is examined further.

EXAMINATION OF INDIVIDUAL ITEMS

Next, we tabulated the results for each of the 100 individual items on the Cornell Index. All items except No. 20, 69, 82, and 87 should "ideally" be answered negatively. The number of inappropriate answers for each item, for the two samples, are presented in the appendix *(6)*. Because the samples were matched

(6) The complete presentation of the numbers of inappropriate responses to each item, for the two samples, was too lengthy to be included in this paper and may be obtained by writing to the senior author.

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TABLE 3. *Distribution of differences in the Cornell Index score for matched pairs of suspects and nonsuspects*

Difference*	Frequency	Cumulative percent
+20 to +29	4	1
+15 to +19	8	3
+10 to +14	15	8
+7 to +9	22	14
+6	10	17
+5	23	23
+4	21	29
+3	21	35
+2	34	44
+1	45	57
0	75	78
−1	30	87
−2	11	90
−3	13	93
−4	8	96
−5	6	97
−6 to −11	10	100

*Obtained by subtracting the score of the nonsuspect from that of the suspect for each matched pair.

$$t = \frac{\sqrt{N-1}\,(M_1 - M_2)}{\sigma_d} = 8.09$$

$P < < .01$

TABLE 4. *Quartiles of Cornell Index scores for suspects and nonsuspects and differences between matched pairs*

Quartile	C. I. scores		Differences between matched pairs
	Suspects	Nonsuspects	
Q_1	0	0	−0.5
Q_2	2	1	+1.05
Q_3	5	2	+4.2
Average of given scores	3.56	1.4	+2.16

TABLE 5. *Total number of items checked inappropriately for various areas on the Cornell Index, for suspects and nonsuspects, with probability ranges for significance of given ratios*

	Items	Number checked inappropriately			Ratio of suspects to total	p_1 for 5% significance
		Suspects	Nonsuspects	Total		
Fear and inadequacy	2-19	433	159	592	.731	<.695
Depression	20-26	96	39	135	.711	<.630
Nervousness and anxiety	27-33	121	41	162	.747	<.675
Neurocirculatory symptoms	34-38	61	24	85	.718	<.615
Startle reaction	39-46	89	31	120	.742	<.657
Psychosomatic symptoms	47-61	132	66	198	.667	<.599
Hypochondriasis and asthenia	62-68	92	33	125	.736	<.653
Gastrointestinal symptoms	69-79	96	17	113	.850	<.772
Sensitivity and suspiciousness	80-85	115	57	172	.669	<.596
Troublesome psychopathy	86-101	82	50	132	.621	<.536 >.699
Total	2-101	1317	517	1834	.718	.697

for age and education, it is permissible to compare the totals for each item for suspects and nonsuspects. The tabulation of items is summarized here. We present the ratio of the inappropriate responses checked by suspects to the total number of such responses. Then, using the binomial approximation and the 5 percent level of significance, we may test this ratio by the formula:

A significant ratio is a ratio greater than

$$p_1 + 1.96\sqrt{\frac{p_1(1-p_1)}{N}}$$

Because the experiment is not an independent experiment, we have no way of knowing what p_1 is. The psychiatric examiners use the Cornell Index in their examinations and presumably are influenced by each score and by the responses to the individual items, but to what extent no one knows. An independent experiment is difficult in practical work. If the Index were not used, p_1 would be 0.5; that is, a subject giving an inappropriate response to any item would have a 50-50 chance of being declared a suspect. Thus, if any ratio were significantly greater than 0.5, we could define the item as definitely tending to identify suspects.

On the other hand, if the score were used exclusively to identify suspects, the ratio of the total reported score for all suspects to that for all matched pairs, i. e., $p_1 = \frac{1317}{1834} = 0.718$, would give the chance that a man with a given inappropriate response would be declared a suspect. The truth must lie somewhere between the extremes of 0.5 and 0.718, and it is up to the reader to make his own judgment. We compared the computed ratio for each item to various values of p_1 and found that 37 of the 100 items had ratios significantly greater than 0.5; 29 had ratios significantly greater than 0.55; 17 had ratios significantly greater than 0.6; 7 had ratios significantly greater than 0.667; and 3 had ratios significantly greater than 0.718. On the other hand, 4 items had ratios significantly *less* than 0.718 and 2 of these were significantly less than 0.667.

The items which designate significantly more suspects than expected by chance were examined and the following observations were made.

A. Significant at $p_1 = 0.718$:

	Ratio
6. Do you often have spells of dizziness?	1.000
72. Do you frequently get attacks of nausea?	.950
83. Do you have the feeling that people are watching or talking about you in the street?	.913

None of the so-called "stop" items *(5)* appear in any of these lists since so few respond inappropriately to them. The "stop" items (No. 32, 33, 55-57, 78, 79, 88, 90, 91, 93, and 95) could not be considered in a sample less than 3 times the size of this one. Items 6, 72, and 83 are important according to Navy standards, indicating vasomotor instability, "nervous stomach," and paranoid feelings respectively.

B. Significant at $p_1 = 0.667$ but not at $p_1 = 0.718$:

	Ratio
11. Do you feel nervous or dizzy right at this moment?	.804
27. Are you considered a nervous person?	.800
47. Do you suffer badly from frequent severe headaches?	1.000
71. Do you often suffer from an upset stomach?	.885

These items are also basic by Navy standards. Of the 7 items of greatest validity, item 27 is most often answered inappropriately by suspects, being answered thus by 13.5 percent of all suspects.

C. Additional key items which differentiate suspects from non-suspects:

	Ratio
16. Do you have to do things very slowly in order to be sure you are doing them right?	.760
29. Do you often have difficulty in falling asleep or staying asleep?	.813
66. Does pressure or pain in the head make it hard for you to perform your duties?	.875

Note that item 66 is one of several which are ambiguous: It is often answered as if worded "Would pressure or pain. . ." We can thus have a list of 10 key items, all except 2 with frequently given inappropriate responses, which we can use to "spot" suspects.

D. Items which definitely do *not* differentiate suspects from nonsuspects:

(1) Significant at p_1 - 0.667 and above:

	Ratio
82. Have you usually been treated fairly? (*No* is inappropriate)	.543
96. Do you always do things on sudden impulse?	.484

(2) Significant at p_1 - 0.718 but not at p_1 - 0.667:

20. Do you usually feel cheerful and happy? (*No* is inappropriate)	.564
51. Have you at times had a twitching of the face, head, or shoulders?	.522

Because there are so few items for which "yes" is the appropriate response, many of the so-called inappropriate responses for No. 20 and 82 are errors by the examinee. On the other hand, No. 69 and 87, also positively worded, do *not* display this phenomenon to any great extent.

E. Areas, i. e., grouping of items:

When the items are grouped according to instructions *(5)* we find that gastrointestinal symptoms are most important, with fear and inadequacy, nervousness and anxiety, startle reaction, and hypochondriasis and asthenia also above the general average (table 5). On the other hand, troublesome psychopathy, psychosomatic symptoms, and sensitivity and suspiciousness are definitely below the general average. Owing to the large contribution which certain items make to some of these tables, these results do not seem to be of much importance.

SUMMARY AND CONCLUSIONS

A study was made of 356 naval recruits who appeared, on the basis of a brief psychiatric interview, as being worthy of further psychiatric examination to determine their potential adaptation to the demands of the naval service. Each of these men was matched by age and education with a man who was designated as being fully qualified for naval training. The Cornell Index had been administered prior to the examination and was available for use by the psychiatric examiner. The responses of these 712 men to the 101 items on the Index were analyzed to determine, on the basis of the short interview and with the psychiatric examiner's use of the Index, which types of psychiatric problems appeared to be most significant in aiding the examiner in his prediction.

We believe that the value of the Cornell Index as a screening device is insignificant, but that it is helpful in the psychiatric interview in focusing attention on certain important "key" items. The value of the present study lies in the fact that it has given empirical demonstration of the comparative values of various items in designating psychiatric suspects. Inappropriate responses were more frequently given to items 6, 11, 16, 27, 29, 47, 66, 71, 72, and 83 by the suspects than by the nonsuspects. Further surveys of the discriminating value of the Index (N-2) will have to be made under independent conditions, i. e., without letting the psychiatrist examine each man's Index.

BOOK REVIEW

Contributions Toward Medical Psychology, Theory and Psychodiagnostic Methods; edited by ***Arthur Weider,*** Ph. D., Associate Professor of Medical Psychology, Department of Psychiatry and Mental Hygiene, University of Louisville School of Medicine, with 53 contributors. Foreword by *David Wechsler,* Ph. D., Associate Clinical Professor of Medical Psychology, New York University College of Medicine; Chief Psychologist, Bellevue Psychiatric Hospital. Volumes I and II. 855 pages; 101 illustrations. The Ronald Press Co., New York, N. Y., publishers, 1953.

These 2 volumes are a compendium of abridged articles previously published and some specially prepared articles selected by the editor as contributions *toward* the field of medical psychology. The contributors include distinguished physicians, psychiatrists, anthropologists, and psychologists. The work is in 4 parts. The first 3, comprising Volume I, are concerned chiefly with general concepts of the role of psychology in medicine. Part I, Psychology and Medicine, consists of an article by Gregg and one by Alexander. Part II, with contributions by Ellis, Gessell, Ammons, Kluckhohn, and Mowrer, discusses psychologic theories, developmental concepts, motivation, personality, and concepts of normality. Part III contains articles on psychosomatic problems. These include a group of psychosomatic concepts and approaches by Halliday, Whitehorn, and Cobb, followed by excerpts from the research of Selye, Sontag, Wolf, Wolff, Mead, Ruesch and Bowman, Greenblatt, and Rusk.

Much of the material in this volume is well known. The selections, sampled from the literature of the past 10 years, are for the most part well chosen to represent important work and important names. There is a question, however, as to the adequacy

of sampling for the purpose indicated by the title of the book. Psychologic concepts and contributions are given cursory treatment while extensive space is devoted to clinical studies in psychosomatic medicine. Mowrer's article, "What is Normal Behavior?", which is a highlight of a previous compendium on clinical psychology is appropriately included in the present collection.

The second volume, comprising all of Part IV, is entitled *Psychodiagnostic Methods and Medical Practice*. The second part of this title might better have been omitted. It is a comprehensive survey of the armamentarium of clinical psychology and includes, without discriminating, representative samples of the best scientific developments and other more intuitive or speculative work in this field. A generally uniform plan of presentation is followed for each instrument, covering purpose, uses, description, rationale, and standardization. Twenty-nine different technics, 2 developmental procedures, 4 tests of intelligence, 2 personality questionnaires, 10 projective procedures, 7 tests of conception and intellectual impairment, and 4 other psychometric instruments are described in this way. Although some of the articles are objective and include or refer to supporting data, this is not uniformly done. The total impression of a wide range of equally useful instruments is probably not justified and the limitations are not pointed out. The final chapter, on psychodiagnostic methods at work, is an interesting and useful demonstration of clinical diagnosis by psychologic methods, presented by a group of specialists in the several technics.

This work will be most useful as a general survey reference. Its treatment is too brief and in some cases too condensed for a text or manual and it fails to guide the reader critically with reference to the limitations of the methods presented in Part IV. As an approach to medical psychology, its shortcomings are greatest. Volume I leans heavily on psychiatry and Volume II, on clinical psychology; but the 2 together do not constitute a *medical* psychology. The printing and index are generally good, but a number of unfortunate typographic errors in the text and tables were found. It is regretted that the references, citing original publications of articles reprinted or abstracted, are not shown in the individual sections. This omission may mislead many readers concerning the priority or source of specific sections.—*S. B. Sells, Ph. D.*

BLOCK THERAPY OF THE SYMPATHETIC NERVOUS SYSTEM(1)

CHARLES H. GILLESPIE, M. D.

JOHN A. HENDERSON, *Major, USAF (MC)*

THE sympathetic and parasympathetic components of the autonomic nervous system are antagonistic balances which regulate the various organs of the body. The parasympathetic or craniosacral portion conserves and restores body resources; the sympathetic portion prepares the body for mass activity. The parasympathetic nervous component is not associated with pain disturbances per se. Vagotonia is a medical problem which is treated by drugs, except that vagotomy may be performed for gastric, pulmonary, pancreatic, or biliary conditions. The sympathetic nervous component contains pain fibers. Pain can be relieved by appropriate interruptions of the nerve pathways by block therapy or by other surgical means.

INDICATIONS

The indications for sympathetic block therapy (2) are acute or chronic vascular occlusion and pain.

Early cervical sympathetic blocks should be used in the treatment of cerebral thrombosis and embolism. Block therapy should be continued until it gives no further benefit. A lumbar puncture is performed when the patient is admitted to the hospital. If the spinal fluid is grossly bloody, denoting hemorrhage rather than thrombosis or embolism, cervical sympathetic block is contraindicated for at least 24 hours. If the spinal fluid is clear, sympathetic block therapy may be instituted immediately. This procedure frequently is followed by marked beneficial results, especially if it is instituted within the first 4 to 8 hours after the onset.

Trench foot, immersion foot, and frostbite have been treated with sympathetic block therapy with questionable results. The most important factor in the treatment of these conditions is the early application of this treatment. Sympathetic block should be performed as soon as possible after the diagnosis is made.

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(1) Scott and White Clinic, Temple, Tex.

(2) Ochsner, A.: Indications for sympathetic nervous system block. Anesth. & Analg. 30: 61-75, Mar.-Apr. 1951.

Acute pulmonary embolism is a medical emergency in which an immediate cervical sympathetic block may save life. The mechanism by which a clot that lodges in one or more pulmonary arteries causes death is unknown. It has been shown that reflexes initiated by the embolus may cause severe arterial spasm, bronchospasm, and cardiac disturbances *(3)*. Some of these reflexes have their afferent pathways over the sympathetic chain, and they may be interrupted by a cervical sympathetic block of the involved side.

Sympathetic blocks are frequently used in causalgia to relieve severe burning, stinging pain, excessive sweating, glossy discoloration, and cold extremities. The value of blocks in sympatheticalgia, or minor causalgia, is less well known. Patients with this condition complain of a burning pain which is less severe than true causalgia, but still incapacitating. Because this condition frequently follows a minor injury, a neurosis or malingering may be suspected. Sympathetic blocks are frequently effective in the relief of this type of pain and should be performed on a diagnostic as well as a therapeutic basis.

The shoulder-hand syndrome consists of pain and limitation of motion in the shoulder with pain and swelling in the hand. It occurs frequently in patients with coronary heart disease but is not limited to them. These patients obtain complete relief after a few successful blocks *(4)*. Phantom limb sensations are a therapeutic problem for all who treat amputees. Sympathetic block therapy occasionally gives relief to these patients. Brachial plexus and low spinal blocks, chordotomy, lobotomy, and psychiatric interviews have been used for this condition with equivocal results.

Vague abdominal pain and that of pancreatitis and cholecystitis may be relieved by splanchnic block. This procedure should never be a substitute for indicated abdominal surgery.

CONTRAINDICATIONS

There are few contraindications to sympathetic block therapy for the trained physician. We use a 1 to 2 percent solution of procaine and efocaine as blocking agents. Procaine sensitivity is manifested by pallor, bradycardia, hypotension, sweating, nervousness, and tremor, which may progress to convulsions. Oxygen and a quick-acting, injectable barbiturate should be administered immediately. Anderson et al. *(5)* have advised the

(3) Carr, D., and Chandler, H.: Dorsal sympathetic ganglionectomy for intractable asthma. J. Thoracic Surg. 17: 1-12, Feb. 1948.

(4) Steinbrocker, O.; Spitzer, N.; and Friedman, H. H.: Treatment of shoulder-hand syndrome (reflex dystrophy of upper extremity), with special reference to sympathetic block; preliminary report. Anesth. & Analg. 27: 273-278, Sept.-Oct. 1948.

(5) Anderson, R. M.; Crowell, D. P.; Twigg, E. J.; and Flynn, J. H.: Diagnostic and therapeutic nerve blocks; 2-year review. Anesth. & Analg. 29: 315-329, Nov.-Dec. 1950.

use of 100 mg. of pentobarbital sodium 1 hour before the injection of procaine as a prophylaxis. This has not been necessary in our experience. Because of the possibility of injury to a blood vessel resulting in a hematoma, sympathetic blocks are contraindicated in patients receiving anticoagulant therapy. Sympathetic blocks are not attempted until the prothrombin, bleeding, and coagulation times have returned to normal. Care should be taken to prevent intravascular and intrathecal injection of the anesthetic drug.

TECHNIC

To treat adequately conditions for which sympathetic block is indicated, the physician must be able to perform cervical or stellate ganglion, splanchnic, and lumbar sympathetic blocks. The anesthesiologist should be charged with the responsibility for block therapy, but any physician who treats these medical and surgical problems should be able to perform sympathetic blocks.

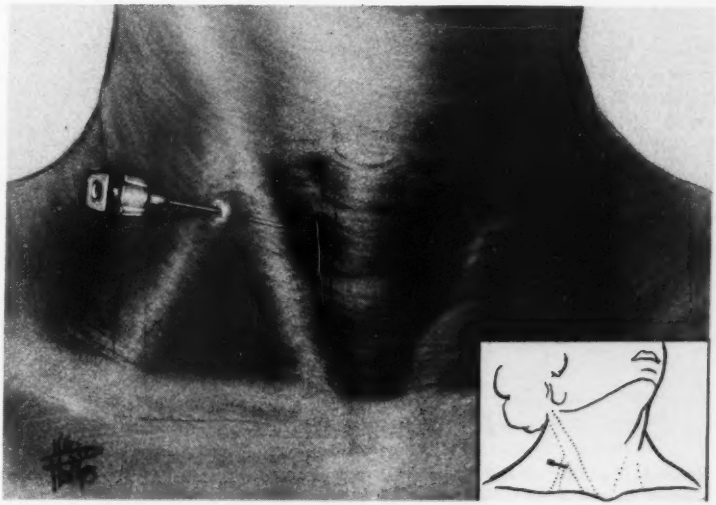


Figure 1. Technic of right cervical sympathetic block. The needle should be directed more posteriorly than it appears in the drawing and should not go beyond the midline.

Cervical or stellate ganglion block. The sympathetic innervation to the brain, head, neck, upper extremities, and thoracic organs is blocked by this procedure. The patient's head is turned to the opposite side with the chin extended slightly. A point about 3 cm. above the clavicle at the apex of the triangle formed by the sternal and clavicular heads of the sternocleido-

mastoid muscle is selected (fig. 1). At this point a skin wheal is raised with 1 percent procaine solution. A 22-gage spinal needle is inserted medially and slightly caudad until it strikes the lateral border of the body of the sixth or seventh cervical vertebra. After aspirating the syringe to make sure that the

Figure 2. Technic of left splanchnic and lumbar block. Needle 1 is shown after being "walked off" the cephalad border of transverse process of the first lumbar vertebra, but should be directed more perpendicularly to the body than is shown here. Needle 2 is shown after being "walked off" the caudad border of the transverse process of the second lumbar vertebra. Line A denotes the position of the diaphragm. Injection above the insertion of the diaphragm will result in a splanchnic block; below, in a lumbar block. Inset shows position of patient for performing these blocks.

needle is not placed intravascularly or intrathecally, from 10 to 15 cc. of a 1 percent solution of procaine are injected. If a longer-acting block is desired, the needle is left in place until

the signs of an effective block are present and then from 5 to 10 cc. of efocaine may be injected. It is advisable to inject the procaine solution prior to the efocaine to minimize the discomfort of the latter. The period of effective block will be decreased by this method, depending on the amount of procaine injected. Bilateral cervical blocks should not be performed at the same time because of the danger of bilateral pneumothorax and bilateral vocal cord paralysis.

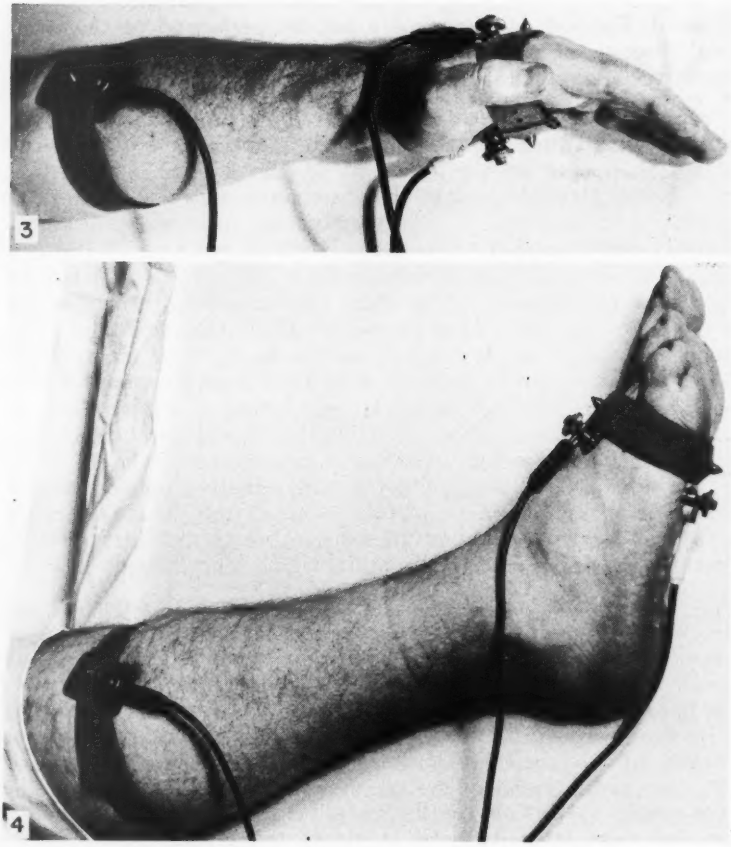
Splanchnic sympathetic block. By this procedure the sympathetic innervation to the abdominal viscera is blocked. The patient is placed on his side with his back slightly flexed. A point about 3 cm. lateral to the interspace between the twelfth thoracic and the first lumbar vertebra is selected and a skin wheal is raised with a 1 percent solution of procaine. A 22-gage spinal needle is inserted perpendicular to the skin until it strikes the transverse process of the first lumbar vertebra. The needle is then "walked off" the upper border of the transverse process and passed more deeply until it strikes the body of the vertebra (fig. 2). The needle is redirected until it barely passes beyond the lateral border of the vertebral body where it will be close to the splanchnic chain. From 20 to 30 cc. of a 1 percent solution of procaine are injected. If the pain is relieved, from 15 to 20 cc. of efocaine are injected for a longer-lasting block. Caution should be exercised in this block because the needle is introduced in the same direction as the opening of the intervertebral foramina and an intrathecal injection might be performed.

Lumbar sympathetic block. By this procedure, the sympathetic innervation to the lower extremities is blocked. The patient is placed on his side as for a splanchnic block. A skin wheal is raised at a point about 3 cm. lateral to the interspace between the first and second lumbar vertebras. A 22-gage spinal needle is inserted perpendicular to the skin until it strikes the transverse process of the second lumbar vertebra. The needle is "walked off" the caudal border of the transverse process, and is directed more deeply until it strikes the vertebral body. The needle then is directed more laterally until it clears the lateral border of the body (fig. 2). After aspirating the syringe, 20 cc. of a 1 percent solution of procaine are injected. If a satisfactory block is performed, from 10 to 15 cc. of efocaine may be injected before the needle is removed.

TESTS FOR EFFECTIVENESS OF BLOCK

Constriction of the pupil, ptosis of the upper eyelid, absence of sweating of the face and upper extremity, and an increase in the temperature of the face and upper extremity will appear following a successful cervical block. Relief of the visceral

abdominal pain is the only evidence of a successful splanchnic block. Increase in temperature and absence of sweating of the lower extremity may be noted following a successful lumbar block.



Figures 3 and 4. Photographs showing the methods of placing electrodes of a direct-writing electrocardiograph to test the psychogalvanic reflex. Notice that the left arm lead is on the dorsal surface and that the right arm lead is on the ventral surface of the extremity. The ground lead is attached at a higher level.

The signs following an attempted sympathetic block sometimes are equivocal. In patients on whom a block has been attempted the psychogalvanic reflex should be determined. This method of testing the success of a cervical or lumbar sympathetic block requires a direct-writing electrocardiograph (6). The right and

(6) Alexander, D., and Lewis, L.: Personal communication.

left arm leads are placed on the ventral and dorsal surfaces, respectively, of the hand or foot of the extremity in question (figs. 3 and 4). The machine is grounded in the usual manner and turned to lead I. The patient is stimulated by a sharp object over any portion of the body. If the sympathetic nerves have been

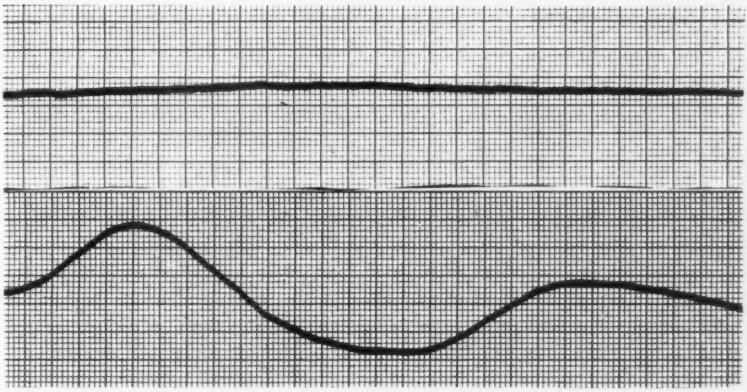


Figure 5. The upper electrocardiographic tracing denotes a successful sympathetic block. The lower tracing indicates normal sympathetic nervous activity.

blocked, the tracing will be flat. If the sympathetic nerves are intact, the tracing will show a definite, gradual curve, following each stimulation (fig. 5). The opposite extremity should be used as a control. Barbiturates and narcotics depress the psychogalvanic reflex.

BOOK REVIEW

Operative Gynecology, by *Richard W. TeLinde*, Professor of Gynecology, Johns Hopkins University and Chief Gynecologist, Johns Hopkins Hospital. 2d edition. 902 pages; 409 black and white illustrations, 7 color plates. J. B. Lippincott Co., Philadelphia, Pa., publishers, 1953. Price $20.

In the 7 years since the first edition, this splendid work has become a standard reference work in its field. The revised edition is indeed welcome to all students of gynecology. The new volume contains 150 more pages, 100 new illustrations, and 5 important new chapters. These new chapters are: "Use of Pes-

saries," "Surgery of the Double Uterus," "Culdoscopy," "Carcinoma of the Cervix in Situ," and "Sarcoma of the Uterus." There has been a helpful change in the make-up of the new edition; namely, that major subheadings of chapters have been more clearly identified by capitalized headings and are not merely indicated in the text by italicization. This excellent work is recommended to all medical libraries of hospitals conducting intern and resident training programs. Its value to the specialist and the general surgeon is inestimable.

The chapter on the use of pessaries is of particular help to hospital residents about to set out in practice. The usual hospital experience does not include much training in the employment of that valuable device. The new chapter describing surgery of the double uterus is of great aid to the gynecologist in handling the occasional cases suitable for surgical treatment. The information contained therein is available in few texts. The value and interpretation of Papanicolaou smears has been clearly presented. TeLinde's background of 20 or more years of experience with the controversial problem of carcinoma of the cervix in situ has produced a very valuable chapter. By the time a third edition is published the proper identification and treatment of this entity should be still more firmly established. The discussion of treatment of endometrial hyperplasia in the chapter on functional uterine bleeding has been rewritten and brought up to date. The short chapter on sarcoma of the uterus will be of assistance to the specialist. The section on that very valuable and practical procedure for properly selected cases, presacral neurectomy, is enhanced by the added discussion of ovarian denervation.

It is interesting to note the trend of the times in the omission of the rather detailed discussion which appeared in the first edition regarding the technic of the administration of sulfonamides in gonorrheal infections of the lower genital tract in favor of antibiotics. The chapters on culdoscopy and hysterography and hysterosalpingography, with splendid illustrations in the latter chapter, present refinements in diagnostic technics which should be considered by every progressive gynecologist. It is with regret that we note the omission of several fine color plates in the chapter on ovarian tumors. It is assumed that this is one of the concessions made to permit the inclusion of many excellent new features.—*Lt. Col. W. Cooley, Jr., USAF (MC)*

PSYCHIATRIC SELECTION OF WOMEN FOR NAVAL SERVICE[1]

JOHN J. EBERHART, *Captain, MC, USN*

CHARLES W. SOCARIDES, *Lieutenant, junior grade, MC, USNR*

IN November 1951, following the opening of the WAVE Recruit Training Center at this naval base, it became increasingly apparent to the neuropsychiatric section that more efficient measures should be taken as regards the psychiatric evaluation, care, and disposition of WAVE recruits. It was, furthermore, deemed essential that the psychiatric standards for women duplicate those existing for men, but that the differences in manifestation of psychiatric disorders in men and women must be considered. Until adequate physical facilities and sufficient trained personnel were made available, the following temporary procedure was instituted.

AVE recruits were seen in the physical examination line by the screening psychiatrist and, if severely emotionally ill, would be hospitalized at the naval hospital. There were many recruits, however, who did not appear to be sufficiently ill or maladjusted to require separation from the service or hospitalization. On the basis of a brief psychiatric interview at the time of initial screening, these recruits were placed on a full-duty or trial-duty status. The trial-duty groups returned for further evaluation at different stages of their training. At any time, WAVE recruits could be returned to full-duty status without subsequent interviews. If a recruit showed increasing maladjustment to recruit life as manifested by the eruption of a pathologic personality type or immaturity reaction, she would be returned to her company until the next aptitude board meeting. At that time her adjustment would be discussed and recommendation for discharge for unsuitability or return to recruit training was advised. Those who expressed their maladjustment in terms of physical complaints without organic cause would be admitted to the dispensary for the period of their acute discomfort. If discharge was recommended, they would be immediately transferred to a separation center.

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(1) U. S. Naval Training Center, Bainbridge, Md.

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PSYCHIATRIC SCREENING

In January 1952, with the completion of adequate physical facilities, the procedures now used and which thus far have proved most effective were begun. Our working hypothesis has been that under the stress and strain of military routine and regulation there is an aggravation or accentuation of underlying personality difficulties with the resultant evidences of inability to cope with the demands of a new and regulated environment. Thus, somatic or psychic complaints and progressive adaptive failure, as evidenced in poor performance in recruit training, will appear depending on the Wave's ability successfully to cope with minor stress and her willingness to conform to military life. A plan, therefore, was evolved in which there was set up a WAVE neuropsychiatric unit which encompassed some aspects of the former method as well as those which were considered to be substantial improvements.

Recruits originally placed on trial-duty status are recalled to the unit for further evaluation after 3 weeks of training. A report from the company commander is made available to the psychiatrist to assist him in determining the adjustment of the recruit to training. This is an invaluable aid in many instances because it contains a description of the recruit's progress as regards response to military regulations. Her social adjustment, ability to learn from experience, control over her emotions (especially fear and anger), and her ability to use her free time and to be a well-adjusted recruit are commented on. Furthermore, her degree of reliability, obedience, and aptitude for military life can be ascertained. This leads the examiner to an investigation in the crucial area of difficulty which could ordinarily only be arrived at through prolonged questioning. In addition, many recruits would meet the questions of the psychiatrist simply with bland or negative responses as regards the presence of difficulties in adapting themselves. Others would not be aware of the importance or meaning of their patterns of behavior. Up to this point, neither the recruit nor the company commander has been aware of the trial-duty status of the recruit. Likewise, these recruits are not singled out in any way for special concern during their training; hence, this unbiased opinion of the recruit's functioning under active training, plus a psychiatric interview, affords a portrayal of her ability to perform and adjust adequately in a military setting. Therefore, if any discrepancies are noted, these may be corrected in time.

At the time of the first trial-duty interview, the recruit is either removed from the trial-duty designation or returned to a further trial period of training. A subsequent interview is conducted about 3 weeks later, at which time she may be admitted to

the unit because of obvious and progressive failure in recruit training, or finally cleared without further evaluation. As basic training for WAVES lasts 9 weeks, a recruit may be seen 3 times if her performance and adaptation appeared borderline but, in the opinion of the examiner, did not warrant admission. During these interviews, in addition to further evaluation, redirection of the recruit's attitude and energy or a quick solution to her emotional problems may be offered by the psychiatrist to enhance further adaptation to naval life. This is one of the primary functions of the unit.

When a recruit is admitted to the unit, it is for purposes of further evaluation and of confirming the decision that she is unsuitable for further military training. During this period of assignment to the unit, there is adequate opportunity to observe her and conduct intensive psychiatric interviews while she continues in a partial program of recruit training conducted in the unit. These recruits are not carried on the regular sick list and their training continues in part. Psychologic tests are given and interpreted by qualified psychologists in those recruits whom the psychiatrist considers as offering problems in disposition, diagnosis, or specific area of maladjustment. On some occasions, a profound therapeutic effect is exerted through the physician-recruit relationship. Likewise, through the efforts of interested, efficient, and kindly personnel, renewed motivation for further training may be kindled to an adequate and realistic degree to justify returning the recruit to training. When discharge from the naval service is indicated after thorough evaluation, the recruit makes a personal appearance before an aptitude board, which acts on the recommendation, subject to the approval of the commanding officer, that the recruit be discharged by reason of unsuitability under honorable conditions. The board is composed of qualified officers including the senior psychiatrist, assistant psychiatrists, clinical psychologist, WAVE line officer, and a male line officer. This board has the prerogative to return the recruit to training if its members make this decision. A Wave returned to duty under these conditions is still followed through subsequent psychiatric interviews to check on her progress in training.

THE WORKINGS OF THE WARD

In the unit there are ward rounds in the morning and evening which constitute, in essence, a regular sick call where complaints are listened to and treatment or advice given. Hours for exercise, lectures by recruit-training instructors on current events and history, and extracurricular activities of other WAVE recruits are made available to the WAVES in the unit. The recruits march to and from activities, have freedom of activity around the WAVE neuropsychiatric unit building, including athletic programs,

educational movies, and movies on military life. A library on the ward and an occupational therapy room aid the process of rehabilitation and the reduction of anxiety. This period of observation has been found to be of utmost value in expediting an accurate evaluation of the individual recruit. It is rarely possible to render a responsible decision on a Wave who is quartered away from the psychiatric unit. Interviews held in unfamiliar surroundings are not conducive to objective evaluations, particularly in matters which have serious implications for the person's future.

SPECIAL PROBLEMS

Table 1 demonstrates several interesting differences in the male and WAVE recruits who are discharged from the naval service by reason of unsuitability. Among the male recruits, inadequate personality was the major nosologic group. Passive-aggressive and immaturity reactions with symptomatic habit reactions (enuresis) formed the next largest group. The comparable data for the WAVES showed a lesser percent discharged in these categories. No enuresis was reported among the WAVES. This was not surprising in view of the fact that enuresis predominantly occurs in the male population. Although an equal percent of passive-dependent reactions were noted in the 2 groups, the passive-aggressive reaction type was almost 3 times as frequent in the male recruits.

The bulk of the reaction types which formed the main basis for discharge in the WAVE population were emotional instability and schizoid personality. These are the more profound psychiatric conditions in which the personality structure includes so many fine nuances.

The differences described between the 2 groups of recruits were a result of the selective process itself. The WAVE population, first of all, is a more select group in terms of educational requirements (twelfth grade or equivalent). Thus, many of the usual problems such as illiteracy, defective intelligence, and general inadequacy were not as frequent in the WAVES. Furthermore, enlistment in the WAVES is entirely voluntary. There is no impending draft which indirectly forces them into the naval service.

Most WAVE recruits were actually aided by the new atmosphere of community living. A sense of security and a feeling of belonging developed in some of them for the first time in life. The rigid requirements of new parental authorities in a new, more dependent way of life may offer additional strength in maintaining their emotional regulation in some instances. On clinical examination, therefore, some recruits who appeared to suffer from

TABLE 1. *Male and WAVE recruits discharged by aptitude board 1 January 1952 to 30 September 1952**

	Male recruits		WAVE recruits	
	Number	Percent	Number	Percent
Types of pathologic personality				
Schizoid	84	9.9	19	17.3
Inadequate	281	33.0	21	19.
Antisocial	35	4.1	0	
Sexual deviate (latent)	6	0.7	0	
Paranoid	2	0.2	1	0.9
Cyclothymic	2	0.2	1	0.9
Immaturity reactions				
Emotional instability	58	6.8	34	30.9
Passive-dependent	87	10.2	12	10.9
Passive-aggressive	119	14.0	6	5.6
Immaturity with symptomatic habit reaction (enuresis)	104	12.2	0	
Aggressive reaction	17	2.0	0	
Disorders of intelligence				
Mental deficiency, primary	3	0.4	0	
Specific learning defect (reading)	5	0.6	0	
Psychoneurotic reactions				
Anxiety	11	1.3	4	3.6
Dissociative	4	0.5	0	
Conversion	15	1.8	5	4.5
Phobic	2	0.2	0	
Obsessive-compulsive	0		2	1.8
Neurotic-depressive	4	0.5	4	3.6
Somatization	11	1.3	0	
Total discharged by aptitude board	850	100.	109	100.
Number of incoming recruits screened	47,469		3,202	
Percent of recruit intake discharged by aptitude board	1.8		3.4	

*The diagnoses used in this report are merely for descriptive purposes. All of these men and women met the minimal requirements of AR 40-115 and were, therefore, not eligible for separation by reason of medical survey. Statistical analysis prepared by Lieutenant Commander H. B. Molish, MSC, USNR. and Lieutenant W. B. Lyon, MSC, USNR.

moderate to severe emotional disturbances on initial screening later "pulled themselves together" under the protective atmosphere of their new military home. The recruits who made the best adjustment, rose rapidly in rate, performed in a superior manner, and showed no signs of emotional distress also presented a rather typical and well-defined constellation of factors. They had a strong capacity for emotional regulation and adaptation and were persons whose main conscious motivation for entering the service was the realistic search for self-improvement which had been blocked through the lack of adequate avenues of expression and development such as productive, stimulating job opportunities or suitable marriageable men in their home community. It was evident that these reasons were not given merely as a rationalization on the part of the recruit.

Other recruits, however, despite the presence of many fine attributes, have difficulty in making an adjustment to military life and should not be forced to accept the challenge of continued training. Many of the latter have definite conscious or unconscious, pathologic, endopsychic conflicts which they have attempted to solve through entry into the service. Some try to escape from a frightening situation with an overprotective mother. Others revolt against parents and authority. Furthermore, some try to solve their adolescent, rebellious impulsiveness to find a place in life and "be someone." In others, an inordinate desire for success in life, based on underlying neurotic fears of failure and feelings of unconscious worthlessness, may have been the motivating force for enlistment, but the desire is usually short-lived because when duties and billets are inimical to the recruit's personality, much frustration and disappointment are the end results. In some, the social and home surroundings seem to be intolerable; while in others, the struggle for education, success in the economic world, and a search for a more sheltered and secure existence seem to be too difficult for them. They try to solve their problems by enlisting in the military service, but it is fortunate that most of these are finding military life a positive and enriching experience. Those who do not adapt readily to this new and regulated way of living, which is so necessary in a military setting, may find the civilian milieu more tolerable after their experience in the service.

The standards for retention of Waves are by necessity higher than those for male recruits. In the male recruit, borderline conditions may be more acceptable in view of the various duty billets available in which an adjustment may be possible, but duty assignments for the WAVE recruit do not have this leeway for borderline adjustments. Many of the PULHES "3" group among the male recruits are able to perform adequately in general-duty billets for which there is no equivalent in the WAVES.

Another problem which faces the WAVE unit arises from the fact that, unlike the male recruits, there are few methods of handling disciplinary problems. Thus, WAVE recruits are referred to the unit because of disciplinary problems. In such cases, the unit through psychiatric examination may uncover emotional disturbances which, if promptly alleviated, will facilitate improvement in general behavior. Deep-seated behavior disorders, however, do not lend themselves to quick solution.

The WAVE recruit who is suddenly taken from recruit training and enters this unit presents a problem. She may become disturbed at the interruption of her training. This requires the tact, gentleness, and psychiatric approach that is necessary toward any person meeting a frustrating situation. On numerous occasions, there is the added complication of a WAVE recruit not desiring discharge despite advice to the effect that she is not suitable for military life. Attempts are made to influence the recruit to accept her discharge under honorable conditions and an attempt is made to decrease any feelings of shame or failure.

CONCLUSIONS

The advantages of a WAVE recruit neuropsychiatric unit are:

1. A continuous check on the adjustment of WAVE recruits in training is maintained by virtue of sufficient staff to handle the many emotional disorders seen in psychiatric examination. This program is oriented for detection and, therefore, prevention of emotional breakdown in young women.

2. Early but definite signs of maladjustment which otherwise would not come to the attention of the psychiatrist before much damage has been done to the recruit and to company morale are detected and admission is recommended.

3. A realistic program, on the part of the company commanders and officers in charge of recruit training, directed toward a careful evaluation and observation of every recruit has resulted. The recruit's assets, liabilities, reactions to stress, potentialities for growth in the Navy, and the methods for possible improvement in her capacities are studied. Those who would weaken the morale of the organization, who would have little to contribute, and who would only decrease the effectiveness of the WAVES are thereby constantly removed. The WAVE recruit neuropsychiatric unit may be likened to the experienced and skilled mechanic who makes a periodic checkup of an automobile to detect beginning trouble in its machinery. It is, thus, an important step in preventive military psychiatry.

4. The transition between military life and return to civil life is softened to some degree, especially in WAVES with a

sense of failure, guilt, or shame at being found unsuitable for further military service.

5. Severely ill recruits with suicidal tendencies, severe depressive reactions, or schizophrenic attacks are detected and hospitalized.

6. During the period of evaluation and observation on the ward, emotional difficulties can be explored and, in some cases, brief psychotherapy may be effective in returning a recruit to duty.

Clinical Applications of Radioisotopes

THE Special Training Division of the Oak Ridge Institute of Nuclear Studies has scheduled a second advanced course in the clinical applications of radioisotopes. The course, to be held from 14-25 September 1953, will consist of lectures, clinics, and exhibits of equipment. Subjects to be discussed include tumor localization, circulatory volumes and outputs, fluid and electrolyte spaces, therapy of blood diseases, theory of radiation dosimetry, radioactivity measurement, gold-198 and other colloids, interstitial and surface applications, teletherapy, iodine-131 in diagnosis and therapy, and external counting. Speakers selected are leaders in the specific fields of interest. Participation will be limited essentially to those physicians who have had clinical experience with radioisotopes. Information and application blanks may be obtained from the Special Training Division of the Institute, P. O. Box 117, Oak Ridge, Tenn.

PSYCHOSOMATIC DISORDERS IN THE SERVICE[1]

WILLIAM F. MURPHY, *Commander, MC, USNR* [2]

THE development of our knowledge concerning stress, exhaustion, and alarm reactions and their relationship to the pituitary-adrenal complex has greatly increased our knowledge of how certain psychosomatic syndromes occur, but as an etiologic agent, the hormonal substance is only one link in a long chain. There is no general agreement on what is a psychosomatic disease. Some believe that all of medicine is psychosomatic and others reserve the term psychosomatic disease for functional disturbances of an organ due to its inappropriate use for the solution of emotional difficulties. The patient's use of his skin in certain cases of excoriative neurodermatitis would be an example of an illness on a semivoluntary basis, and the use of the stomach to express intensified passive oral needs to the point where a chronic gastritis was produced would be an example of an involuntary process. Perhaps a better example of the latter would be certain cases of blepharitis that are connected with the denial of grief and which can be completely relieved by episodes of weeping. Such an approach, however, is too atomistic and emphasizes the split in the concepts of psyche and soma. Still others prefer to use the term "somatization reaction," which can apply either to organs of motility or internal organs. One of the better definitions is that given by Deutsch *(3, 4)* who stated that "psychosomatic medicine is the systematized knowledge of how to study bodily processes which have become fused and amalgamated with emotional disturbances in the past and in the present." This should be explained because its simplicity is deceiving.

Our understanding of psychosomatic disease rests essentially on our understanding of why some persons tend to become organically ill in response to overwhelming stress, whereas others tend to develop a neurosis or a psychosis, or suffer a pathologic character change which is a surrender of certain highly developed

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(1) Read at the Medical Military Symposium, U. S. Naval Hospital, Chelsea, Mass. 27 October 1952.

(2) Veterans Administration Hospital, Boston, Mass.

(3) Deutsch, F.: Use of psychosomatic concept in medicine. Bull. Johns Hopkins Hosp. 80: 71-85, Jan. 1947.

(4) Deutsch, F.: Psychosomatic concept, Acta Med. Orient. 7: 33-42, Mar. 1948.

and habitual inhibitions. Although this question cannot be definitely answered, theoretical speculations might be summarized as follows: Patterns of adjustment to stress are laid down in the early formative years of life and crystallize in certain character patterns or habitual reactions which are never purely psychic but are interwoven with somatic manifestations; i. e., mental attitudes and reactions are interwoven with complex vascular, endocrine, and chemical reactions which are in part specific for the organism and in part a result of experience. Deutsch *(5)* has labeled this process "conditional dispositional fusion." This fusion involves the entire person but may manifest itself chiefly in one organ or organ system. It involves more than the concept of the Pavlovian conditioned reflex and is nearer to the Gestalt concept. Furthermore, like the Gestalt concept it is an entity in itself and can be reactivated either from the organic or the psychic side. Accordingly, all organic changes in the body, including illnesses, tend to activate certain psychic constellations involving thought, behavior, and emotion.

Likewise, events arousing emotional attitudes previously associated with an "organic" illness will tend to activate certain organ syndromes. This gives the phrase "character patterns" a much wider meaning in terms of habitual reactions on the part of both the body and the mind. Such patterns can roughly be classified as infantile, adolescent, or adult. New patterns are constantly being superimposed in an inhibiting and controlling sense over the old. In each case, they are an exquisitely balanced combination of action, structure, thought, and feeling. These patterns can also be classified as abnormal or normal according to their appropriateness for the age of the individual and the mixture of impulsive emotional elements with logically verbalized elements. The proportion of emotional elements and their physiologic repercussions are the crux of the problem. Throughout life, the emotions can be tamed and harnessed or denied and repressed. They cannot be kept from occurring and from producing bodily changes which, when they rage out of hand, may appear as a psychosomatic disease. A psychosomatic illness in this sense means the revival of a distorted infantile character pattern of defenses against repressed emotions linked with certain past unbearable situational difficulties, the organic part being manifest and serving as a disguise or a vehicle for the emotional and ideational elements which remain hidden. The term "adult" simply implies behavior in keeping with common and socially accepted standards.

Every person is a kaleidoscopic mixture of adult, adolescent, and infantile character patterns, all interlocked and mutually

(5) Deutsch, F.: Choice of organ in organ neuroses. Internat. J. Psycho-Analysis 20: 252-262, July-Oct. 1939.

interdependent on one another for the maintenance of each individual's unique personality. Adult character patterns are the first line of defense against the anxieties and vicissitudes of life and work hand-in-glove with hidden but persistent infantile megalomanic feelings such as "harm cannot occur to me as long as I live a certain way." Emotional and physical traumas and losses of all kinds continually occur. Such trauma can lead to a disintegration of the adult character patterns and a revival of infantile anxieties with physical concomitants when an organ system bears an excessive load. One of the most convincing proofs of this is the shift in the balance of character patterns, which is a personality change, due to the complications, aftereffects, and psychosomatic results of a severe injury, a narrowly escaped accident, or even an incapacitating organic illness.

Is there a type of person especially susceptible to a psychosomatic illness? Although anyone can be affected, the compulsive person who is overly "adult" and unable to come to terms with his emotions is chiefly affected. There are many such persons who deny their emotions a satisfactory measure of expression and who tend throughout the years to accumulate anxieties and delayed emotional responses that press for discharge. This is particularly true when an expression of strong emotion is called for at times such as death, marriage, divorce, birth, love, and war experiences which throw the normal social order into a ferment. These persons place a great load on their stress-adapter mechanisms, and preserving mental and physical homeostasis becomes increasingly difficult for them as they age and face the inevitable frustrations of life. A blow to the head, a physical illness, or an emotional upset, according to their past conditioning, can act as the last straw to the overworked, stress-adapter mechanisms, both psychic and organic, and precipitate a reaction of great severity. This reaction appears ostensibly in only an "organic" form. When it does, it means that the "organic" illness is being used by the patient to derive gratifications and to discharge repressed and suppressed emotional feelings. Some of the gratifications are defensive; i. e., the illness acts as in conversion hysteria and prevents painful emotional material and memories from coming to consciousness. The affected organ, whether it is the head in patients with chronic, posttraumatic headache, or the lungs and chest in patients with asthma *(6)*, becomes the central point of the patient's life, and feelings are related to this organ which belong to the past and the present. The illness itself becomes a part solution to the patient's past and present difficulties and a defense against the painful necessity of facing real or fantasied personality inadequacies.

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(5) Deutsch, F.: Psychological methods of obtaining medical information. Acta Med. Orient. 5: 249-272, Aug. 1946.

The relationship of physiologic homeostasis to its psychic counterpart can be demonstrated in a different way. The homeostatic balance of hundreds of patients under intense emotional strain becomes so precarious that they show signs and symptoms of many incipient psychosomatic diseases (7). Such symptoms as musical rales, joint pains of a transient nature, injected sclera, headache, blepharitis, extrasystoles, diarrhea, back pain, and phosphaturia are legion and few people in the course of a lifetime fail to develop one or more of them. One syndrome observed frequently among exhausted personnel from Guadalcanal consisted of the following stages: (1) an increased contrast in red and white mottling of the palmar areas leading to (2) formation of pinpoint blebs in the white areas accompanied by itching, and (3) secondary excoriation and infection. Most of such patients, with rest and local measures, recovered before stage 3 was reached. According to past conditioning and its usefulness in solving past problems, any one of these transient physical states can be the early stages of a severe psychosomatic disease.

Prevention is therefore the best remedy. We remove the patient from the stressful environment and try to re-establish the adult defensive character patterns as quickly as possible. Fortunately, this tends to occur by itself. Mild disorders, which comprise most of them, need little or no treatment other than rest and change of pace. The more severe disorders need a twofold type of therapy in addition to physical treatment. The patient's difficulties, both in the present and past, must be brought to his consciousness as a continuum. He must be encouraged to develop a more realistic solution to his problems. In this manner, the affected organ system can be relieved of its psychic entanglements so that its physiologic responses will not be impaired or overburdened. Sometimes it is difficult to distinguish the mild from the more severe disorders because the apparent strength of the personality of those prone to develop psychosomatic disorders makes an evaluation difficult.

What confuses the issue is that in our civilization we tend to overestimate the stability of compulsively oriented persons who are able calmly to intellectualize their way through life but who appear to be especially susceptible to many psychosomatic disorders. A major difficulty in dealing with these patients is their proneness to intellectualize and avoid emotional commitments. An even greater difficulty is the defensive reaction and the anxiety produced in them by any attempt to get them to discuss their emotional problems with a psychiatrist. This is due to the great regard they have for the intellectual processes, the integrity of which is associated with deep-rooted anxieties and emotions

(7) Halliday, J. L.: Psychosocial Medicine. W. W. Norton & Co., Inc., New York, N. Y. 1949.

concerning the integrity of their bodies. Insight therapy is thus technically difficult and time consuming. In one sense, the psychosomatic disease is the patient's last stand. The interview situation not only threatens to deprive him of this but adds insult to injury. This develops in the patient an enormous amount of aggression which poses a difficult technical problem or a complete surrender on the part of the patient who rapidly regresses to a passive, dependent, infantile character pattern which means a greater technical problem for the therapist, especially in a military setting where time is at a premium. Peacetime psychiatric standards do not apply in treating most such patients. In the military service, the secondary gains of any psychiatric illness are great. The receiving of psychotherapy, being placed on a neuropsychiatric ward, or having a psychiatric consultation tends to become an easy road to separation from the service and receiving disability compensation. A more subtle danger is that the psychiatrist, with inadequate time to use insight therapy, may make a chronic psychiatric casualty out of a patient with a transient psychosomatic illness who if allowed to respond to simple measures could be returned to duty. This point cannot be stressed too much. A person who is allowed to escape easily from his duties via the psychiatric service cannot so lightly escape from his conscience which in the case of the person with a psychosomatic disease is more difficult than in the ordinary neurotic. The problem is convincing himself that he really was very ill and he will remain ill as long as he doubts his own fulfillment of his standards of manhood.

Deutsch *(8)* mentioned the problem of interviewing these patients and stated that a patient will reveal a great deal of information that is psychologically relevant to his psychosomatic illness only if he is unaware that we are interested in this material and especially if he is allowed to speak in an offhand manner. Deutsch further remarked that the relief a patient experienced in being able to confide in someone was only temporary but nonetheless important. The value of placing a patient's mind at rest should not be underestimated. In a theater of war, this can be done more easily by a surgical or medical officer than by a known psychiatrist. Learning how to do this is easy for and invaluable to all medical officers.

This leads to our program of treatment of psychosomatic illnesses. Most important are rest and good medical care. The psychologic repercussions of this are enormous. Exact medical advice, ritualistic nursing care, administration of medicines, and scientific explanations to the patient are of great psychic value in relieving hidden anxieties. The taking of medication

(8) Deutsch, F.: Associative anamnesis. Psychoanalyt. Quart. 8: 354-381, July 1939.

by mouth, and especially by injection, has great significance beyond its physiologic aspects; i. e., there are magic qualities to it which reach down to the most infantile strata of the patient's personality and satisfy deep-seated needs well recognized by the homeopaths in the past. This treatment in itself will relieve the milder disorders. Our second approach is by the interview which allows some expression of the patient's personal and interpersonal problems, both in the present and in the past, preferably by means of the associative anamnesis type of interview. This is fairly easily taught and is well covered in the literature *(6, 8–10)*. When psychiatric aid becomes imperative, the initial consultation work should take place on the medical or surgical ward, the psychiatrist appearing simply as another medical officer. Emotional catharsis does not always have to be "deep" to be effective. The value of situational changes in many cases is beyond question and should be recommended when necessary. In the service a frequent cause of emotional difficulties is the "square-peg-in-the-round-hole" situation. This is due in part to the necessities of the military setup and our tendency to believe that psychologic plasticity is always directly related to chronologic age.

In addition to medical care, emotional catharsis, and situational change, the continued psychotherapy and ancillary treatment of patients with chronic psychosomatic disorders is important. This should be planned according to the patient's needs, preferably by his physician and a psychiatrist in combination with the head of the ancillary service. In these patients, body conditioning should receive a high priority. This is extremely important in the military service which encourages the development of compulsive obsessional and phallic aggressive character traits that are decried or denied by most persons in a normal civilian setup. The encouragement of these character traits in emotionally rigid persons and those prone to psychosomatic disorders, tends to arouse certain anxieties from the past. It is here that body conditioning takes on its significance. Muscular activity is associated with the relief of anxiety and tension and hard muscles, erect posture, and good physical condition are psychologically associated with ego intactness and strength and are of tremendous aid in warding off anxieties and fears of disintegration ("going to pieces") commonly found in psychosomatic conditions.

As an offshoot of our awareness of the "abnormal" nature of the military setting, we might use only selected nursing personnel and stress ambulatory nursing care for the milder psychiatric

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(9) Murphy, W. F., and Kligerman, S.: Associative anamnesis in teaching insight psychotherapy. Dis. Nerv. System 11: 291-297, Oct. 1950.

(10) Deutsch, F.: Applied Psychoanalysis. Grune & Stratton, Inc., New York, N. Y., 1949.

patients in the combat zone, because extended bed rest and maternal nursing care tend to encourage a "giving in" and a regression to more dependent infantile character patterns. The word "selected" is used advisedly because there are maternally oriented men as well as women. The use of secondary gains is especially marked in patients with psychosomatic disease and this should be borne in mind in prescribing bed rest and nursing care.

A major part of preventive psychiatry and a most important feature of treatment is morale building, which has largely been neglected by us. Although educational, social, and Red Cross workers and occupational therapy aids are adjuncts to morale building, the most important morale factor is connected with the reason why the serviceman is fighting and for what. Morale building should not be confused with "entertainment," which is somewhat overrated and misunderstood. This problem is intimately intertwined with that of leadership and is a subject beyond the scope of this paper.

SUMMARY

Patients with mild psychosomatic disorders do not represent difficult psychiatric problems. Insight therapy on a long-term basis is not feasible and should not be attempted by inexperienced personnel. Treatment while in the military service should be prompt, symptomatic, and superficial. Minor and moderately severe disorders can and should be treated on a medical service with or without psychiatric help. The only patients who should be referred to a neuropsychiatric service for extended treatment are those whose psychosomatic disorder is severe, chronic, or secondary to a neurotic breakdown or psychosis. In these patients, all adjunctive aids and activities should be used. In war when there is a shortage of doctors, the ancillary service personnel, including attendants, corpsmen, and nurses, should be trained to help the patients to discuss superficial emotional problems. Such training should be given at a simple level. Job classification and morale building are important both in the prevention and treatment of these disorders. Most of these patients can function adequately in an environmental setup peculiar to their individual needs and will respond to simple measures.

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A TECHNIC FOR MAKING TEMPORARY CROWNS, SPLINTS, AND BRIDGES

With Direct Resinous Filling Materials

DAVID J. BARABAN, *Captain, USAF (DC)* (1)

DIRECT resinous filling material can be used for making temporary crowns, splints, and bridges which are comfortable, functional, and esthetically acceptable to the patient. The technic is a duplicating procedure whereby the desired teeth are reproduced in the plastic material. A tem-

Figure 1. Lower left cuspid, second premolar, and second molar prior to preparation for full acrylic veneer crowns for bridge abutments.

porary plastic crown can be made to duplicate the anatomy and shade of the natural tooth that is being prepared for full crown. This technic is not original. Its use can be varied according to the desire and ingenuity of the operator.

The same procedure is used for one or more teeth (fig. 1). The tooth to be prepared for full crown should be intact. If it is

(1) Presque Isle Air Force Base, Me., at time of writing; now 358 Commonwealth Ave., Boston 15, Mass.

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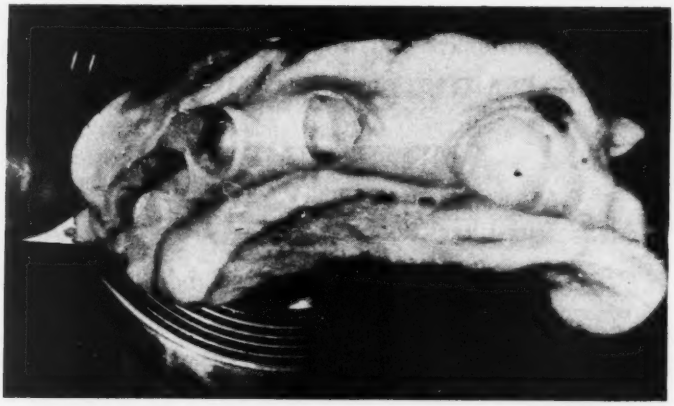

Figure 2. Sectional impression with alginate of abutment teeth.

not, its missing portions usually can be restored with gutta-percha or other suitable material. The first step, prior to cutting the tooth, is to take a sectional impression with alginate of the area which includes the tooth (fig. 2). The impression should be checked carefully. Material in the interproximal embrasures should be cut away to insure accurate reseating of the impression in the mouth. The impression must be kept moist during the preparation of the tooth. Talkov *(2)* has advised that it be placed in a humidifier rather than in water or a fixing solution so that it does

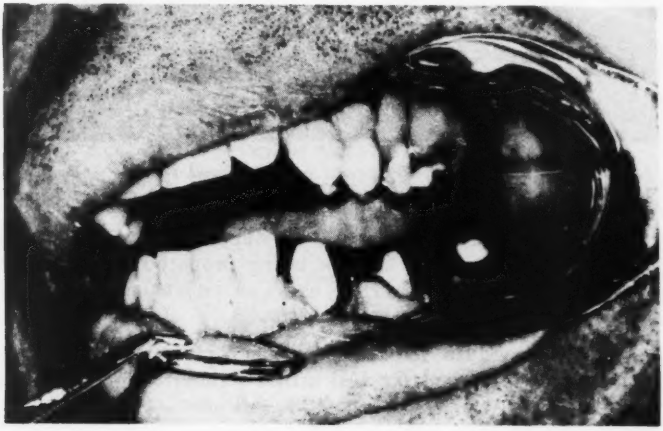

Figure 3. The abutment teeth have been prepared for full acrylic veneer crowns.

(2) Talkov, L.: Personal communication.

Figure 4. Temporary plastic crowns in position.

not become stiff but retains the elasticity it had when withdrawn from the mouth. He suggested the use of a small, nearly airtight, plastic box in which moist cotton can produce the humidifying effect.

When the preparation of the tooth is completed (fig. 3), the impression is reseated in the mouth to determine the proper path of insertion. The prepared tooth is lubricated with a thin coat of petrolatum. Moisture is removed from the impression with compressed air. Sufficient plastic filling material of the chosen

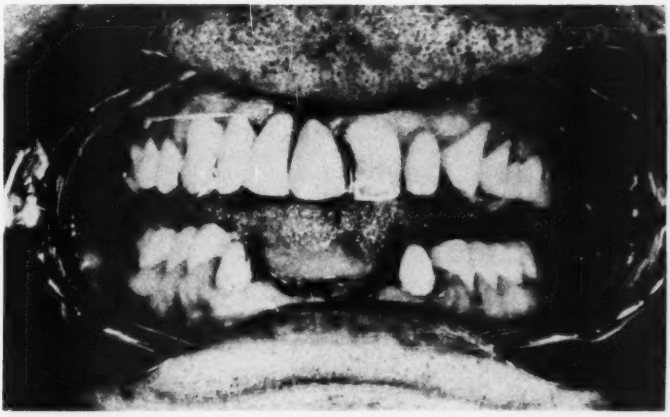

Figure 5. Photograph shows lower cuspids prepared for acrylic veneer crowns as bridge abutments.

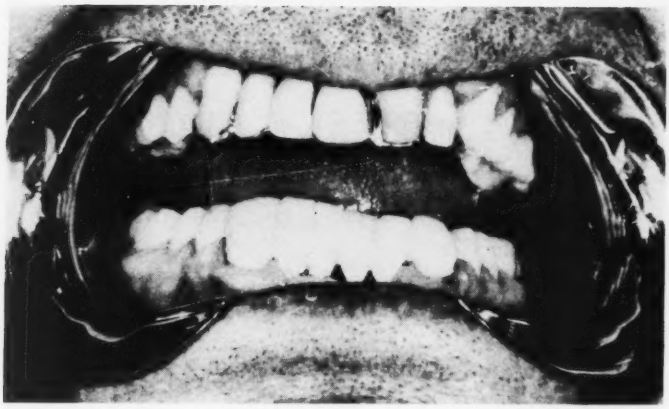

Figure 6. Temporary lower anterior bridge of direct resinous filling material in position.

shade is mixed and placed so as not to entrap air within the impression of the tooth for which the crown is being made. The impression is reseated accurately in the mouth, held in position for 1 minute, and then withdrawn. The plastic material will usually remain within the impression and much of the excess, which will be pliable, should be trimmed away with a small pair of sharp scissors. If it remains on the tooth, the excess should be similarly removed. The impression should be again reseated accurately in the mouth, held in position for about 4 minutes, and then removed. The plastic crown, which has started to set, usually remains on the tooth, but emits a great deal of

Figure 7. Patient with carious upper central incisors which are vital.

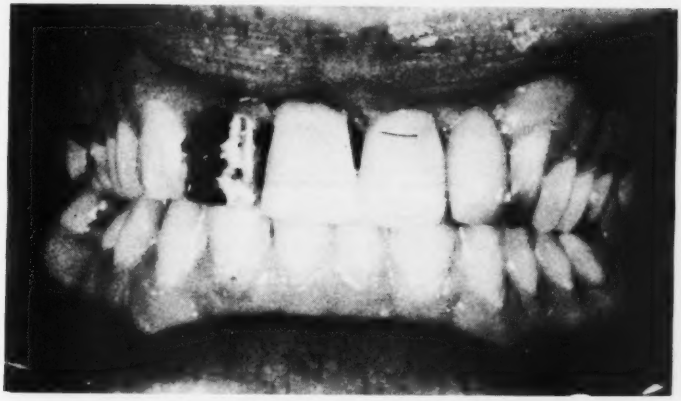

Figure 8. Same patient with temporary acrylic crowns in position on the upper central incisors. Note that they are still joined (splinting effect) at the incisal third as one unit.

heat *(3)*. It is advisable at this point either to remove the crown from the tooth or cool it with water to prevent thermal injury to the pulp.

After the crown has been removed from the tooth and the heat of polymerization has been dissipated, it can be trimmed and polished. Care should be taken to finish properly the gingival margin so that it will not irritate the gums. The crown, which is a facsimile of the tooth prior to its preparation, will have the same alinement and occlusion as the tooth did (fig. 4). Before cementing it in position with a zinc oxide-eugenol preparation, it is advisable to enlarge slightly the inside of the crown with suitable burs or stones to insure easy removal and allow space for the cement.

This is the basic technic and may be used to duplicate bridges as well as crowns (figs. 5 and 6). When crowns are prepared on adjacent teeth for splinting purposes, a temporary plastic splint may be made in the same manner (figs. 7 and 8) by allowing the individual crowns to remain joined at their incisal or occlusal thirds. A temporary bridge in the mouth, particularly in the anterior region, may be constructed by using the same procedure. Patients often have either a central or lateral incisor missing which they wish to have replaced by fixed bridgework. If the patient is wearing a temporary stay plate, it is a simple matter to remove the anterior tooth from the base material and wax it in alinement with the teeth on either side of the edentulous area. The alginate impression is taken and the temporary plastic

(3) Wolcott, R. B.; Paffenbarger, J. D.; and Schoonover, I. C.: Direct resinous filling materials; temperature rise during polymerization. J. Am. Dent. A. 42: 253, Mar. 1951.

bridge is constructed after the abutment teeth have been prepared. If the patient does not have a stay plate, an anterior tooth can be quickly ground in and waxed in position. The pins or retentive undercuts should be covered with wax to insure a smoothly finished surface.

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CYANOSIS

A Review of Current Concepts

LEONARD R. ROBBINS, *First Lieutenant, USAF (MC)* (1)

CYANOSIS denotes a blue discoloration of the skin, mucosa, nailbed, retina, and other less readily visible portions of the body, and depends on unoxygenated hemoglobin in the blood circulating through the superficial vessels. Its presence, or absence, and intensity are important in direct and differential diagnosis and the prognosis of many diseases (2–5). Slightly more than 100 years ago cyanosis was regarded as a disease entity. Today it is believed to indicate disturbance in function. The historical background of cyanosis was reviewed by Lundsgaard and Van Slyke (2).

ETIOLOGY

For cyanosis to be present, each 100 cc. of capillary blood must contain 5 or more grams of unoxygenated hemoglobin and, occasionally, methemoglobin or sulfhemoglobin. Because anoxemia is the primary cause of the presence of increased amounts of reduced hemoglobin in the blood, its relationship to cyanosis is unquestioned. During recent years, reinvestigation by improved scientific methods has shown that cyanosis is not a reliable index of the degree of anoxemia, as had previously been assumed (6, 7). In general, cyanosis is caused by inadequate arterial oxygenation, inadequate transport of oxygen by the blood, and polycythemia.

PATHOLOGIC PHYSIOLOGY

Physiologic, chemical, and physical processes influence the degree, distribution, and shade of the cyanotic color. In light-skinned people, the bloodless skin observed in an extremity

(1) U. S. Air Force Hospital, Sheppard Air Force Base, Tex.

(2) Lundsgaard, C., and Van Slyke, D. D.: Cyanosis. Medicine 2: 1-76, Feb. 1923.

(3) Meakins, J. C.: Cyanosis. Internat. Clin. 2: 67-84, June 1933.

(4) Clendening, L., and Hashinger, E. H.: Methods of Diagnosis. C. V. Mosby Co., St. Louis, Mo., 1947. pp. 135-136.

(5) White, P. D.: Heart Disease. 4th edition. The Macmillan Co., New York, N. Y., 1951. pp. 37-40.

(6) Comroe, J. H., Jr., and Dripps, R. D.: The Physiological Basis for Oxygen Therapy. Charles C Thomas, Publisher, Springfield, Ill., 1950. pp. 19-47.

(7) Comroe, J. H., Jr., and Botelho, S.: Unreliability of cyanosis in recognition of arterial anoxemia. Am. J. M. Sc. 214: 1-6, July 1947.

with arterial occlusion is a waxy white *(8)*. The normal pinkness or redness of the skin and mucous membranes is related to the amount of hemoglobin in the blood in the underlying capillaries or subpapillary venous plexus. The red color results from the absorption of blue and green light by hemoglobin *(8)*. Oxyhemoglobin and reduced hemoglobin have similar absorption spectra in the free transmission of visible red. Reduced hemoglobin transmits more blue light and causes the blue hue of venous blood *(8, 9)*. Cyanosis is spectrophotometrically related to reflected light rather than to transmitted light. Cyanotic patients reflect more light of violet wave lengths and less of red and green wave lengths than do normal persons *(9)*.

Cyanosis is usually generalized but may be localized and may vary from a barely perceptible blue to dark purple. Changes in the capillary blood produce cyanosis as well as the pallor of anemia. Icterus is caused by pigments which are present in the intervascular tissues as well as in the blood vessels and is observed in the relatively avascular sclera where cyanosis is not usually seen. The cyanotic color disappears when the blood is pressed out of the skin but the icteric color does not *(10)*.

The detection of cyanosis involves color appreciation on the part of the examiner. Variations in appreciation exist among well-trained observers and with the same observer at different times. Studies with the oximeter have yielded surprising results *(7)*. Unless cyanosis is marked and persistent, it may be unimportant *(5)*. Cyanosis and anoxemia are not synonymous. Anoxemia is more important and should be diagnosed by all available means *(7)*.

The degree and shade of discoloration in cyanosis varies with the individual. The following modifying factors are not capable of producing cyanosis, but influence the amount of unsaturation necessary to produce a visible color change in the skin and to modify the color produced: (1) the thickness of the avascular epidermis; (2) the degree of pigmentation of the skin (sunburn, tanning, racial characteristics, icterus, Addison's disease, argyria, et cetera); (3) variations in color of the blood or plasma (pigments, lipids, leukocytes, et cetera); (4) variations in the concentration of oxyhemoglobin in the blood; (5) variations in number, width, length, and character of blood-filled superficial vessels; (6) variations in the extent to which superficial blood

(8) Burchell, H. B.: Basis of cyanosis in tetralogy of Fallot. Proc. Staff Meet., Mayo Clin. 22: 162-165, Apr. 1947.

(9) Sheard, C., and Brown, G. E.: The spectrophotometric analysis of color of skin and observations by this method in normal and in pathologic subjects. Arch. Int. Med. 38: 816-831, Dec. 1926.

(10) Bauer, J.: Differential Diagnosis of Internal Disease. Grune & Stratton, Inc., New York, N. Y., 1950. pp. 445-449.

approximates in unsaturation the arterial or the venous blood; and (7) variations in the light in which the skin is examined *(2)*.

Hemoglobin, the coloring agent in the erythrocytes, forms a stable compound, methemoglobin, which is a true oxide. Skin discoloration appears when over 3 grams of methemoglobin are present in each 100 cc. of blood *(11)*. Reduced hemoglobin when combined with hydrogen sulfide forms sulfhemoglobin which imparts to the blood a chocolate color. The color of cyanosis depends on the absolute amount of reduced hemoglobin present in the blood and not on the relative amount of oxyhemoglobin and reduced hemoglobin *(12)*. The following basic factors operate to produce cyanosis: (1) the total content of hemoglobin in the blood, (2) the amount of hemoglobin deoxygenated in the passage of blood from arteries to veins, (3) the fraction of total hemoglobin passing in reduced form through pulmonary capillaries, and (4) the fraction of the total hemoglobin shunted through unaerated channels from the right side of the heart to the peripheral arteries *(2)*. If abnormally high, each of these may produce cyanosis. They usually occur in combination.

About 10 grams of hemoglobin pass through the lungs per second and they carry a large amount of oxygen to the tissues. Blood can transport about 60 times as much oxygen as plasma *(11)*. Capillary blood must have 7 unsaturated volumes per 100 cc. for cyanosis to exist and that corresponds to a definite degree of anoxemia. Cyanosis may exist to a marked degree, as in polycythemia, without anoxemia, but, on the other hand, a patient may die of anoxemia without exhibiting cyanosis, as in severe anemia in which there are not 5 grams of hemoglobin available per 100 cc. of blood to become unoxygenated *(13)*, in carbon monoxide poisoning, and in cyanide poisoning *(12)*. In shock, peripheral vascular constriction may mask cyanosis *(6)*. The level of CO_2 in the blood has no direct relationship to the production of cyanosis *(11)*, but there are instances in which anoxemia is accompanied by a decrease in CO_2 because of its elimination by hyperventilation. Partial collapse of peripheral vessels, which depend in part for their normal state of dilatation on the presence of adequate CO_2, causes the overlying skin to become pallid. The combination of pallor and cyanosis produces a distinctive gray color *(4, 12)*.

(11) Best, C. H., and Taylor, N. B.: The Physiological Basis of Medical Practice. 5th edition. The Williams & Wilkins Co., Baltimore, Md., 1950.

(12) MacBryde, C. M.: Signs and Symptoms. J. B. Lippincott Co., Philadelphia, Pa., 1952. pp. 280-286; 676-677; 690-691.

(13) Sodeman, W. A. (editor): Pathologic Physiology: Mechanisms of Disease. W. B. Saunders Co., Philadelphia, Pa., 1950.

CLINICAL CONDITIONS ASSOCIATED WITH CYANOSIS

Cardiac disease. Cyanosis has long been considered an important prognostic sign in heart disease. It occurs in congenital defects that produce a venous-arterial shunt and in mitral valvular disease associated with dyspnea. It may also be a late symptom in congestive heart failure and in all kinds of advanced cardiac disease. Cyanosis occurred in nearly half the patients with congenital heart disease in Abbott's series *(14)*. It is greatly reduced in patients with the tetrology of Fallot by the Blalock-Taussig operation, or a similar procedure *(10, 15)*. Cardiac catheterization and angiocardiography have confirmed earlier theories that patients with actual or potential venous-arterial shunts exhibit the cyanotic color *(16, 17)*.

Pulmonary disease. Pulmonary conditions are the most common causes of cyanosis. Those who live at high altitude have chronic anoxemia and usually polycythemia which disappears on transfer to sea level. Anoxemia at elevations of 10,000 feet is so severe that many persons become cyanotic on exertion. At 17,000 feet, cyanosis is usually present even in persons at rest and may be accompanied by clubbing of digits, polycythemia, cor pulmonale, and congestive failure. With acclimatization anoxemia is corrected, but cyanosis persists because of the polycythemia *(12)*.

Ventilatory insufficiency and inadequate admixture of gases within the alveoli occurs in severe emphysema, causing anoxemia and cyanosis *(18)*. Osler stated: "Cyanosis of an extreme grade is more common in emphysema than in other affections with the exception of congenital heart disease. It is one of the few diseases in which a patient may be able to go about and walk into the hospital or consultation room with a lividity of startling intensity." *(2)*

Pulmonary and pleural fibrosis and pneumonconiosis, by limiting ventilatory effectiveness, may cause anoxia and cyanosis as does excessive surgical removal or compression of lung tissue. Primary pulmonary vascular sclerosis ("Ayerza's disease") and pulmonary arterial hypertension cause cyanosis. Acute pulmonary diseases, such as pneumonia, bronchiolitis, atelectasis, and pulmonary embolism, may be accompanied by a transient cyanosis.

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(14) Abbott, M.: Congenital heart disease. In Nelson's Loose-Leaf Medicine. Thomas Nelson & Son, New York, N. Y., 1937. pp. 207-321.

(15) Taussig, H. B., and Blalock, A.: Observations on volume of pulmonary circulation and its importance in production of cyanosis and polycythemia. Am. Heart J. 33: 413-419, Apr. 1947.

(16) Friedberg, C. K.: Diseases of the Heart. W. B. Saunders Co., Philadelphia, Pa., 1949.

(17) Selzer, A.: Chronic cyanosis. Am. J. Med. 10: 334-355, Mar. 1951.

(18) Baldwin, E. de F.; Cournand, A.; and Richards, D. W., Jr.: Pulmonary insufficiency; study of 122 cases of chronic pulmonary emphysema. Medicine 28: 201-237, May 1949.

Blood disease. Cyanosis may result from primary polycythemia in the absence of anoxemia or may be accentuated by polycythemia secondary to anoxemia because the physiologic unsaturation of capillary blood in the presence of a high content of hemoglobin often reaches values above the threshold for visible cyanosis. The arterial saturation in polycythemia vera is normal, although cyanosis may be present when the patient is at rest or only when he exerts himself. The increased blood volume causes capillary dilatation with resultant stagnant cyanosis *(19)*.

Cyanosis in the newborn is similar to cyanosis in the adult. The fetus in utero has a relatively insufficient oxygen supply that may be further impaired by drugs or obstetrical procedures. Fetal blood has a compensatory increase in total hemoglobin concentration because its degree of oxygen unsaturation is equivalent to that of maternal venous blood. McKhann *(20)* compared a "physiologic cyanosis" of the fetus to the "physiologic jaundice" after birth.

Cyanosis in anesthetized patients. The occurrence of cyanosis in an anesthetized patient indicates anoxemia and signifies that the oxygen intake should be increased. It is notably absent in open drop anesthesia but occurs not infrequently in closed system anesthesia *(2)*.

Miscellaneous. Local cyanosis is encountered in areas where venous drainage is impaired. Severe cyanosis of the face may develop if the superior vena cava is compressed by a mediastinal tumor or aortic aneurysm. If an aortic aneurysm perforates into the superior vena cava, a typical syndrome, characterized by sudden cyanosis and edema of the face and a bruit over the shunt, rapidly appears *(10)*.

Acrocyanosis constitutes a uniform and relatively permanent discoloration of cold and moist hands and feet, seen frequently in patients with autonomic nervous imbalance *(10)*, that may be caused by venous spasm with atony of the capillaries *(21)*. If blue or purple mottling extends to the proximal parts of the extremities, livedo reticularis is present and exposure to cold intensifies the discoloration.

Methemoglobinemia may cause a discoloration of the skin and mucous membranes which resembles cyanosis, but it is blue gray or blue brown rather than blue purple. The diagnosis is made by

(19) Meneely, G. R., and Kaltreider, N. L.: Study of volume of blood in congestive heart failure; relation to other measurements in 15 patients. J. Clin. Investigation 22: 521-530, July 1943.

(20) McKhann, C. F.: Cyanosis of newborn. J. Michigan M. Soc. 40: 455-458, June 1941.

(21) Wright, I. S.: Vascular Diseases in Clinical Practice. The Year Book Publishers, Inc., Chicago, Ill., 1948.

spectroscopic examination of the blood *(22)*. Some investigators have stated that the compound formed by sulfonamides and hemoglobin is distinct from methemoglobin and sulfhemoglobin *(13, 23)*. Methemoglobinemia may occur in infants receiving formula made with well water containing nitrates that are converted by intestinal flora to nitrites which are absorbed and oxidize hemoglobin. Methemoglobin may be present in normal blood in amounts up to 0.1 gram per 100 cc. *(24)*. A rare, familial type of methemoglobinemia can be recognized by the exclusion of the extrinsic etiologic factors and by its duration and occurrence in several members of a family *(24)*.

Clubbing of the fingers is frequently associated with cyanosis, but there is probably no direct causal relationship *(25)* though both are manifestations of the same pathologic process. In the differential diagnosis of diseases producing cyanosis, it is helpful to know whether clubbing and secondary polycythemia are present *(25)*.

TREATMENT

The treatment of cyanosis is the treatment of the underlying cause. It directs attention to anoxemia and the need for oxygen. Certain tissues are more susceptible to anoxia than others. The arms and legs may be deprived of oxygen for 1½ hours by arterial occlusion and still recover normal function *(26)*. Permanent brain damage or even death may follow asphyxia for a period of from 5 to 10 minutes *(26)*. The heart and adrenal glands also are particularly sensitive to severe anoxia.

When cyanosis is caused by the admixture of venous and arterial blood or tissue anoxia, little benefit can be expected even from the administration of 100 percent oxygen because the blood leaving the lungs is already 95 percent saturated. The oxygen dissociation curve illustrates that only an insignificant rise in oxygen content can be obtained under these circumstances, and this is due to an increase in the amount of oxygen in solution in the plasma. When inadequate oxygenation of pulmonary blood is the cause of cyanosis, oxygen therapy is usually beneficial. In pneumonia, oxygen helps to overcome the anoxemia caused by shallow and inefficient breathing associated with pain

(22) Ross, C. F.: Enterogenous cyanosis. J. Roy. Army M. Corps 88: 123-127, Mar. 1947.

(23) Kalliner, S.: The cyanosis developing during treatment with sulfanilomide preparations. Acta med. Scandinav. 130: 1-110, Mar. 1942.

(24) Baltzan, D. M., and Sugarman, H.: Hereditary cyanosis. Canad. M. A. J. 62: 348-350, Apr. 1950.

(25) Mendlowitz, M.: Clubbing and hypertrophic osteoarthropathy. Medicine 21: 269-306, Sept. 1942.

(26) Barach, A. L.: Physiologic Therapy in Respiratory Diseases. 2d edition. J. B. Lippincott Co., Philadelphia, Pa., 1948.

and alveolar exudate *(12)*. In pulmonary edema a vicious cycle may occur with edema producing anoxemia, which in turn produces more edema. This may be overcome by the administration of oxygen *(12)*.

SUMMARY

Cyanosis is caused by the presence in the capillary blood of an amount of unoxygenated hemoglobin in excess of the threshold value. It may be produced by many pathologic conditions associated with anoxemia or increased hemoglobin content of the blood. It is not a reliable index of the degree of anoxemia. The degree of oxygen saturation of the blood should be measured directly if it is of importance to treatment.

BOOK REVIEWS

Gynecology, Diseases and Minor Surgery, compiled and edited by *Robert J. Lowrie,* M. A., M. D., F. A. C. S., D-OG., Associate Clinical Professor of Obstetrics and Gynecology, College of Medicine, New York University; Attending Gynecologist and Obstetrician, St. Vincent's Hospital; Attending Obstetrician, City Hospital, Welfare Island; Attending Gynecologist, Willard Parker Hospital; Formerly, Chairman, Section of Obstetrics and Gynecology, New York Academy of Medicine, New York, N. Y.; Consultant in Gynecology and Obstetrics, Passaic General Hospital, Passaic, N. J.; Fellow of the New York Academy of Medicine; Fellow of the American Public Health Association. Foreword by *Claude E. Heaton,* M. D. 806 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1952. Price $22.50.

Great interest will naturally be directed toward any well-organized, comprehensive, and current textbook dealing with gynecology because many women remain under the management of the general practitioner. Major surgical procedures, which are required by only a small proportion of gynecologic patients, have prudently been omitted. The emphasis has properly been given to diagnosis, treatment, minor surgery, and female endocrinology. The editor, who is also a contributor, has devoted the text strictly to the field of gynecology and expects the reader to consult other sources for information regarding the disorders often encountered in allied fields such as female urology and general surgery. Considering the large number of other contributors, a remarkably uniform plan of presentation without contradiction and repetition has been maintained. The initial outline in detail of each chapter increases the availability of material throughout the text and the double-column page facilitates reading. Illustrations have generally been very well selected. The bibliography is not exhaustive but is representative and adequate.

The initial chapters devoted to anatomy excel in the presentation of the confusing musculofascial structures and are otherwise adequate except for the short chapter on the vascular system. The drawings are confusing, too diagrammatic and depict some inaccurate relationships. The chapter on diagnosis is well illustrated. The author, however, fails to clarify, particularly for the energetic but uncertain student and less experienced physician, a systematic and thorough method for the proper performance of clinical gynecologic examination. Several subsequent chapters such as those devoted to the normal menstrual cycle, carcinoma of the cervix, puerperal infections, ovarian tumors, infertility, and minor surgery are especially good. The chapter on physical therapy in gynecology should prove helpful to many clinicians because crowded medical curricula and graduate training have not usually permitted sufficient attention to this type of treatment. The section on medications commonly used in gynecology is informative, but any coverage of this subject must be incomplete and becomes obsolete in a discouragingly short time. This book deserves to become a standard textbook.

—Comdr. E. B. Hopper, MC, USN

Clinical Endocrinology, Volumes I and II, by *Lewis M. Hurxthal,* M. D., F. A. C. P., Head of the Department of Internal Medicine, Lahey Clinic, Boston; Physician, New England Baptist and New England Deaconess Hospitals, Boston, and *Natalija Musulin,* B. S., M. D., Staff of Cooper Hospital, Camden, N. J. Volume I, 749 pages; Volume II, 850 pages. 482 figures, 146 charts, 1 color plate. J. B. Lippincott Co., Philadelphia, Pa., publishers, 1953.

This new book is "planned to provide source material in outline form." It covers the endocrine glands and such related subjects as sterility, obesity, metabolism, and steroid compounds. The outline followed generally consists of a division into preclinical and clinical phases with consideration given to normal, decreased, and increased functional states of each gland. The chapters on the pituitary, thyroid, ovary, testis, and pancreas are especially good. The chapter on the adrenals is surprisingly brief and the consideration of the cortex and medulla of the adrenals in the same chapter is, at times, confusing. The photographs and charts are good. More than 9,000 references are listed and there is a good index. This book fulfills the purpose for which it was designed; namely, a practical reference on endocrinology, but it does not replace the usual narrative text.

—Lt. Col. S. H. Sandifer, MC, USA

PAIN EQUIVALENTS TREATED WITH ELECTROSHOCK

LESLIE B. HOHMAN, *M. D. (1)*

WILLIAM E. WILKINSON, *Colonel, MC, USA (2)*

THE senior author of this communication has long believed that many of the so-called psychoneuroses should be classified as affective disorders. Although the chief presenting symptoms may be physical complaints or neurotic functional manifestations (hypochondriacal, neurasthenoid, anxiety, hysterical, or obsessive-compulsive symptoms), a more complete examination reveals that the essential findings of an affective disorder are present. This would lead to the conclusion that the presenting symptoms are to be understood as only one part of a clinical picture which should be sharply differentiated from the general group of psychoneuroses in which the presenting symptomatology is the whole of the clinical picture.

We can expect that if this proposed differentiation is correct, the course and outcome of this group of patients i. e., those having an affective disorder with psychoneurotic presenting symptoms, would be that of other affective disorders; that their disease would be self-limited with relief of all symptoms when the affective disorder had run its course.

This thesis can be tested by the therapeutic use of electroshock which has the ability temporarily or permanently to abolish pathologic pervasive affectivity. We emphasize the temporary character of the abolition of pathologic affectivity because relapse is often a disappointing result.

A test of this hypothesis was made on 50 patients in a 3-year study. The need for therapy in a group of patients on the neurosurgical service presenting symptoms which suggested neurosurgical disease was urgent and psychiatric help was requested.

The problem was set up in the beginning with the following provisions:

1. We would be willing to treat patients in whom the presenting symptom was pain (severe head, back, facial, thoracic,

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or abdominal pain) for which no adequate explanation could be found.

2. We stated that the method could be expected to yield successful results only if the evidence for disturbed pathologic affectivity was apparent.

3. We would not refuse to treat patients with psychoneurotic pain, but would anticipate poor results.

Later we added a further aim to our protocol—namely to use electroshock as a diagnostic method in certain patients before a radical operation was undertaken.

The urgent need for active therapy in this group of patients was pointed up by the fact that severe pain often leads to the use of addicting drugs. When this occurs, recovery from the affective disorder leaves the patient with another condition more serious than the original. Furthermore, prolonged treatment for possible physical disease by neurosurgical procedures often superimposes an iatrogenic psychoneurosis.

Of the 50 patients reported here, 32 were successfully treated. By successful treatment, we mean complete recovery or recovery to such a degree that all drugs were discontinued and the patient was able to return to work. Of these, 30 were diagnosed as circumscribed depressions and recovery was regarded as probable before treatment. Of the 32 patients, 18 were taking morphine, codeine, or demerol in addicting doses, and 3 others were taking large doses of barbiturates. There was complete cure without relapse in 19. In 11 there was a slight relapse; but in 5 of these, a second course of shock therapy resulted in complete recovery. The other patients refused adequate treatment. In our experience, pain stops after from 2 to 4 treatments and some patients refuse to continue the treatment. A few have refused further treatment because of the apprehension accompanying a shock treatment.

CASE SUMMARIES

The types of patient treated are summarized as regards their presenting symptoms: a patient with (1) low back pain radiating to the legs and no relief following removal of a herniated nucleus pulposus and spinal fusion; (2) recurrent low back pain of 8 years' duration and no relief following removal of a herniated nucleus pulposus; (3) posttraumatic low back pain of 2 years' duration and no relief following removal of a herniated nucleus pulposus; (4) posttraumatic low back pain radiating to leg and jerking of left arm of 18 months' duration; (5) pain in lower spine, tinnitus and drawing sensation in the ears of 3 years' duration; (6) pain in lower spine and right groin and leg of 3 years' duration (no herniation of nucleus pulposus found on operation);

(7) low back and right leg pain of 18 months' duration with no relief following spinal fusion; (8) low back pain and pain in lower extremities of 8 years' duration (patient had had operations for removal of herniated nucleus pulposus); (9) low back pain and right leg pain of 2 years' duration (following childbirth); (10) recurrent low back pain and cramping in left leg of 12 years' duration; (11) low back pain of 9 years' duration and no relief following removal of herniated nucleus pulposus and spinal fusion; (12) low back pain, pain in neck, pain in both eyes, and headaches of 18 months' duration, following trauma; (13) post-traumatic pain in foot of 18 months' duration; (14) pain in right hip; (15) trigeminal neuralgia of 7 years' duration with no relief following 3 alcohol injections; (16) pain on right side of the face of 3½ years' duration with no relief following alcohol injection or partial sympathectomy; (17) recurrent headaches accompanied by severe nausea and vomiting of 3 years' duration; (18) severe headaches of 10 months' duration; (19) recurrent abdominal pain of 8 years' duration (patient had 8 hospital admissions with 2 abdominal explorations, including a subtotal gastric resection); (20) abdominal pain, low back pain, and flank pain (hydronephrosis) of 4 years' duration and many surgical operations; and (21) pain in left shoulder and arm of 1 year's duration with recovery following psychotherapy and treatment with dexamyl.

Of the 18 patients in whom treatment was unsuccessful, 10 were diagnosed as psychoneurotic before treatment and were not regarded as having affective circumscribed disorders; 4 of the remainder were regarded as having psychopathic personalities. Seven of the 18 had superimposed depressive episodes. These improved, but relapse occurred in all but 1; and 4 were thought to have circumscribed depressions. One had a severe fungus infection of the spine with severe pain and morphine addiction. After 6 treatments, he became paranoid and treatment was discontinued. Later a lobotomy was performed. At first, the results were disastrous but at the end of a year the patient was able to return to work. Another patient, a man of 75 years, developed acute urinary retention after one treatment and had to have a prostatectomy. A third patient had periodic attacks of right-sided facial pain. She obtained marked relief but not complete recovery. Her symptoms suggested organic factors. The fourth had bilateral frontal headaches and pain in both ears and on the left side of the face. He improved markedly but relapsed.

The use of electroshock may be an important diagnostic aid: A 45-year-old man developed a severe pain in the right lower extremity which could be controlled only by large doses of morphine. He was unable to continue work and the cost of morphine, obtained illegally because physicians, suspecting that he was a drug addict, were unwilling to continue to prescribe the

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drug, became prohibitive. The neurosurgeons were unwilling to accept the diagnosis of drug addiction without more intensive search for the cause and treatment of the pain. It was decided to give the patient a diagnostic trial of electroshock therapy. We were confident that at the end of 4 or 5 treatments, psychogenically determined pain would be markedly alleviated, if not totally relieved, even if it later recurred. This man obtained no relief. A chordotomy was performed and his pain was immediately relieved; no further drugs were required; and the patient was able to return to his work promptly.

DISCUSSION

The recognition of self-limited affective states in outpatients, especially those whose symptoms led them to consult an internist or surgeon for the relief of physical complaints, is probably difficult because the concept of affective psychoses or manic-depressive disorders is derived from hospitalized patients with severe mental disorders. Many psychiatrists believe that the severe manic-depressive psychoses are of a different order than the milder noninsane affective disorders seen in outpatients. The psychiatrist has been unwilling to see that outpatients with these affective disorders are akin to hospitalized patients with severe mental disorders. All the special categories of reactive, simple, psychoneurotic, and neurotic depressions constitute an attempt—which seems to us faulty—to separate severe and less severe cases and regard them as differing qualitatively instead of only quantitatively.

The response of patients to electroshock is strong confirmatory evidence of our point of view. Furthermore, careful history-taking will reveal that many episodes of mild depression are preceded or followed by definite elative periods. There is often a history of repeated previous attacks of depression and elation. These are frequently masked because they are put down to prolonged convalescence following operations, often unnecessary, or childbirth.

SUMMARY

Fifty patients with severe pain, often requiring addicting doses of morphine, demerol, or codeine were treated with electroshock. In 32, recovery was predicted as probable because they were regarded as having circumscribed affective disorders from which they should spontaneously recover if they were not converted into drug addicts or iatrogenic neurotics. The improvement and recovery rate in these patients justified our assumption that pain can be an equivalent of a psychic symptom in affective disorders.

The 18 patients who were not benefited by electroshock therapy had psychoneurotic illnesses or psychopathic personality disorders. In 4 of the patients who were thought to have depression, treatment resulted in complications which necessitated cessation of therapy, recovery was not complete, or a complicating organic factor was present.

The results in this series are encouraging and would seem to prove that pain, when it is an accompaniment or equivalent in affective disorders, will be benefited by electroshock therapy or will stop spontaneously if given time. A therapeutic test trial of electroshock therapy is a valuable diagnostic procedure for deciding whether or not to perform a prefrontal lobotomy or chordotomy for the relief of intractable pain.

BOOK REVIEWS

Office Management of Ocular Diseases, by *William F. Hughes, Jr.*, M. D., Professor and Head, Department of Ophthalmology, University of Illinois College of Medicine; Ophthalmologist in Chief, Illinois Eye and Ear Infirmary, and Attending Ophthalmologist, Presbyterian Hospital, Chicago. 452 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., publishers, 1953. Price $9.

Although this small but excellent book presents little material which is startling or new, it is concise, well-written, and describes practical and tried methods. Valuable up-to-date aids in diagnosis and therapy which have been gathered from many sources are herein consolidated. In the outline of recommended treatments the author may seem slightly dogmatic but such action seems justified by the size of the book. Indications for some major surgical procedures are discussed, but only a few minor procedures are covered in detail. Several of the photographic illustrations seem indistinct, especially those of the fundus. The chapter on radiation therapy is excellent and covers in detail the indications, the methods of application, the dosage, and the expected results of beta radiation, grenz rays, x-rays, and gamma rays. The final chapter is an up-to-date ophthalmic formulary. This is not an exhaustive reference book, but will be a valuable aid for the physician who treats an occasional eye patient, and for the student, or the ophthalmologist who desires a small volume which provides current opinion on important and common eye diseases.—*Maj. W. W. McKinney, MC, USA*

Psychiatric Treatment, Proceedings of the Association, December 14 and 15, 1951, New York, N. Y. With 49 illustrations and 62 tables. Research Publications, *Association for Research in Nervous and Mental Disease.* World List Abbreviations: Res. Publ. Ass. nerv. ment. Dis. Volume XXXI. Editorial Committee: *S. Bernard Wortis,* M. D., Chairman; *Morris Herman,* M. D., and *Clarence C. Hare,* M. D. 451 pages; illustrated. The Williams and Wilkins Co., Baltimore, Md., publishers, 1953. Price $9.

This collection of papers covers various aspects of evaluation of therapy and types of therapy. A most important and valuable technic of presentation is a summary which follows each group of 4 or 5 related papers, and the well-edited discussion of the topics. In the field of individual and group psychotherapy, 17 papers are presented from such workers as Alexander, Rogers, Ruesch, Lidz, and Frank. In biologic, electric, and pharmacologic treatments, the area is reviewed and evaluated by Hughes, Kalinowsky, Hoch, Meduna, and others. The third and final area is that of neurosurgical treatments with papers from 8 groups of investigators in this field. This symposium brought together workers who were especially interested in evaluating the effectiveness of different treatment methods. It was hoped that a critical evaluation of the effectiveness of treatment methods would be achieved. In fact, the title of this book is somewhat misleading; "Critical Evaluation of Psychiatric Treatment" would be more correct. Although many sections are disappointing as far as reaching this critical evaluative goal, the collection of papers and discussions is well worth while as an addition to any psychiatrist's library.—*Comdr. S. V. Thompson, MC, USN*

The Anatomy of the Nervous System, Its Development and Function, by *Stephen Walter Ranson,* M. D., Ph. D., Late Professor of Neurology and Director of Neurological Institute, Northwestern University Medical School, Chicago. Revised by *Sam Lillard Clark,* M. D., Ph. D., Professor of Anatomy, Vanderbilt University School of Medicine, Nashville. 9th edition. 581 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., publishers, 1953.

The present revision of this well-known standard textbook of neuroanatomy is superb. Many portions of the text have been rewritten, skillfully blending the more pertinent newer developments into the book without changing its organization or making it unduly long. Excellent new illustrations have been added. This book not only presents descriptive gross and microscopic neuroanatomy but also correlates structure with function. This enhances the usefulness of the book tremendously. It is highly recommended to medical students and clinicians as well as to neuroanatomists. The bibliography is excellent and up to date.

—*Lt. Col. J. W. Sumner, MC, USA*

LOCAL CHEMOTHERAPY OF SURGICAL WOUNDS[1]

PHILIP W. FENNEY, M. D.

JOSEPH M. MILLER, M. D. [2]

A PROGRESSIVE decline in the incidence of surgical wound infections has occurred because of the improvement in surgical technic and the systemic use of the antibacterial agents. A further decrease in the incidence of infection in operative wounds which are unavoidably contaminated with bacteria might be achieved by the local implantation of broad spectrum antibacterial agents before closure. The sulfonamides have been used locally in contaminated surgical wounds and in wounds due to external violence to reduce the incidence of wound infection. Their use was attended by an inflammatory reaction, a delay in healing, and a collection of serum postoperatively in the sutured wound. In addition, the sulfonamides used were neutralized by para-aminobenzoic acid, which is commonly already present in such wounds. The original enthusiasm for their local use was not warranted (3, 4).

Marfanil (4-amino-methylbenzene-sulfonamide hydrochloride) is a highly soluble white crystalline powder which is bactericidal in vitro for a large number of aerobic and anaerobic bacteria. It is active in the presence of blood and pus and is relatively nontoxic to tissues. Its bactericidal activity is rapid (5) and is best at a pH of 7.8 but lessens with the acidity until complete inactivation occurs at a pH of 2. A 1 percent solution is bactericidal in vitro to the anerobes; *Clostridium perfringens, Clostridium septicum, Clostridium botulinum, Clostridium feseri, Clos-*

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(1) Reviewed in the Veterans Administration and published with the approval of the Chief Medical Director. The statements and conclusions published by the authors are the result of their own study and do not necessarily reflect the opinion or policy of the Veterans Administration.

(2) Surgical Service, Veterans Administration, Fort Howard, Md.

(3) Meleney, F. L., and Whipple, A. O.: Statistical analysis of study of prevention of infection in soft part wounds, compound fractures, and burns with special reference to sulfonamides. Surg., Gynec. & Obst. 80: 263-296, Mar. 1945.

(4) Posch, J. L.; Maun, M. E.; Pilling, M. A.; and Hirshfeld, J. W.: Effect of sulfanilamide and sulfathiazole on human tissue. Surg., Gynec. & Obst. 80: 143-147, Feb. 1945.

(5) Howes, E. L.: Local chemotherapy of wounds; tissue toxicity of certain antibacterial substances. Surg., Gynec. & Obst. 83: 1-14, July 1946.

tridium histolyticum, Clostridium tetani, and *Clostridium novyi (6).* Marfanil has minimum bactericidal action on *Proteus vulgaris, Aerobacter aerogenes, Pseudomonas aeruginosa,* and *Klebsiella pneumoniae.*

Howes *(5)* reported that a solution of 5 percent marfanil with 200 units of streptomycin per cc. of water was valuable locally in the sutured wound. In rabbits, this mixture was not irritating because it did not produce hyperemia of the eye, adhesions in the peritoneal cavity, or leukocytosis or fibrosis of the muscle. Contaminated surgical wounds washed with the mixture prior to suturing healed well *(5, 7, 8).* Howe *(9),* after testing the sensitivity of 50 strains of organisms isolated from surgical wound infections against penicillin, streptomycin, marfanil, bacitracin, and urethane, stated that marfanil was the most effective topical agent. To be nontoxic to living tissue cells the drugs must be used in a low concentration. Their use in combination for local chemotherapy heretofore reported has been in a liquid menstruum *(5, 7, 8).*

The 2 drugs are mixed with powdered sterile gelatin which has the advantage of slow dissolution and absorption in the wound *(10, 11).* The drugs have longer contact with contaminating bacteria and produce a better inhibiting effect. Gelatin is nonirritating, nonantigenic, completely absorbable, has a mild hemostatic effect, and does not interfere with wound healing *(12).* Sinclair and Douglas *(13)* reported that coating wounds in animals with gelatin powder resulted in a 33 percent increase in the firmness of the healing after 5 days and that the wounds healed with less reaction and with a finer scar than wounds in the control animals.

We have used a mixture of 0.05 gram of marfanil *(14)* and 200 units of streptomycin per gram of finely powdered sterile gelatin *(15).* This mixture has remained stable and potent at room

(6) Sulfamylon (sulfabenzamine hydrochloride). Winthrop-Stearns, Inc., New York, N. Y., 1948.

(7) Howes, E. L.: Prevention of wound infection by injection of nontoxic antibacterial substances. Ann. Surg. 124: 268-276, Aug. 1946.

(8) Keefer, C. S.: Antibiotics up to date. Merck Report 61: 3-8, Apr. 1952.

(9) Howe, C. W.: Studies on susceptibility of bacteria to various antibacterial agents with comparison of serial tube dilution and filter paper disc methods of testing. Surg., Gynec. & Obst. 91: 669-672, Dec. 1950.

(10) Kabat, H., and Freedman, A. M.: Effect of slowly absorbed epinephrine in experimental shock. Proc. Soc. Exper. Biol. & Med. 46: 385-387, Mar. 1941.

(11) Kalmon, M.: Clinical comparison of epinephrine in oil and epinephrine in gelatin. J. Allergy 12: 55-60, Nov. 1940.

(12) Correll, J. T., and Wise, E. C.: Certain properties of new physiologically absorbable sponge. Proc. Soc. Exper. Biol. & Med. 58: 233-235, Mar. 1945.

(13) Sinclair, J. A., and Douglas, B.: Local implantation of gelatin in wounds. Arch. Surg. 49: 47-50, July 1944.

(14) The marfanil (sulfamylon) was supplied by Winthrop-Stearns, Inc.

(15) The gelatin was supplied by the Knox Gelatin Company.

temperature for over 2 years and does not support the growth of molds. In aqueous solution it has a pH of 7. The bactericidal action of marfanil and streptomycin, separately and in combination, was tested in vitro by the filter paper disk technic using 45 strains of bacteria from infected surgical wounds (table 1). These bacteria were tested against varying concentrations of the drugs, using the area of inhibition as a criterion. The optimal concentrations were 0.05 gram of marfanil and 200 units of streptomycin per cc. of water. Little or no increase in inhibition was produced by greater amounts of the drugs. Although some of the bacterial strains tested were not sensitive to the individual drugs, all were inhibited by the combination.

TABLE 1. *Area of inhibition, in vitro, of 45 strains of bacteria**

Bacteria	Number of strains	Area of inhibition after 24 hours (mm.)		
		With 5% marfanil	With 200 units of streptomycin per cc.	Combination of the 2 drugs
M. pyogenes var. *aureus* (coagulase positive)	8	2 - 6	0 - 3	2 - 5
Str. hemolyticus	6	10 - 13	0 - 12	8 - 12
Str. viridans	3	5 - 12	6 - 9	8 - 12
Str. faecalis	2	1 - 2	2 - 3	2 - 3
E. coli	6	0 - 3	3 - 5	2 - 6
Pneumococcus	5	5 - 10	2 - 5	7 - 9
K. pneumoniae	3	1 - 2	0 - 6	2 - 4
Ps. aeruginosa	4	2 - 3	0 - 5	2 - 5
A. aerogenes	3	0 - 1	5 - 7	5 - 6
P. vulgaris	5	4 - 6	2 - 7	2 - 3

* Para-aminobenzoic acid (1:5,000) was added to the culture medium in its preparation. Significant changes in the areas of inhibition did not occur in 48 hours.

Fifty milligrams of marfanil and 200 units of streptomycin dissolved in 1 cc. of a 20 percent aqueous solution of gelatin did not cause hyperemia of the rabbit's conjunctiva, but increases in the amounts of the drugs caused hyperemia of the conjunctiva and clouding of the cornea. Neither gross nor microscopic evidence of peritoneal adhesions or irritation was present 1 month after 20 cc. of this solution were injected into the peritoneal cavity of guinea pigs and rabbits.

Encouraging results were obtained when surgical wounds following operations for acute gangrenous appendicitis and dis-

eases of the large bowel were dusted with the mixture of marfanil and streptomycin in powdered gelatin. After the peritoneum was sutured, the wound was dusted with the drug mixture and closed without drainage. Seven wound infections occurred in 102 patients when this adjuvant therapy was used, as compared with 19 infections in 139 patients when it was not used (table 2).

Block excision of noninflammatory pilonidal cysts has been performed in 48 patients, followed by dusting the wound with the described mixture, primary closure, and the postoperative systemic administration of penicillin and streptomycin for 6 days. Three patients had poor results, one due to a wound infection. In 71 control patients this local therapy was not used and 7 had poor results, 5 of them due to wound infection (table 2).

TABLE 2. *Comparison of wounds treated with local antibacterial mixture*

Type of operative wound	Therapy	Number of patients	Number infected	Percent infected
Acute gangrenous appendicitis	Local and systemic	60	4	6.7
	Systemic	87	11	12.7
Large bowel diseases	Local and systemic	42	3	7.1
	Systemic	52	8	15.4
Pilonidal cyst excision with primary closure	Local and systemic	48	1	2.1
	Systemic	71	5	7.0

All wounds in which the local therapy was used and no infection developed healed firmly in about 10 days with a soft, white scar and without any inflammatory reaction or collection of serum in the wounds. *Proteus vulgaris, Escherichia coli,* and *Micrococcus pyogenes* var. *aureus* were isolated from the wounds of patients with poor results. All recovered bacteria were still inhibited in vitro by the mixture as shown by the filter paper disk method of testing.

Hunter *(16)* described the ideal antiseptic as one having high germicidal or inhibitory properties, no tissue toxicity or at most a low toxicity, freedom from specificity, efficiency in the presence of organic matter, power to penetrate, stability, and perhaps other characteristics, including low cost. The suggested mixture

(16) Hunter, A. C.: Evaluation of antiseptics. J. A. M. A. 121: 25-27, Jan. 2, 1943.

of marfanil and streptomycin in gelatin powder approaches these criteria. Toxic or allergic reactions, either locally or systemically, have not been observed. A higher concentration of these bactericidal agents will be achieved locally by the use of the recommended mixture than is possible by systemic therapy. Local chemotherapy is not advised as a substitute for proper surgery or systemic antibiotic therapy, but only as an adjuvant in contaminated surgical wounds.

SUMMARY

The combination of marfanil and streptomycin is bacteriostatic or bactericidal to a large number of aerobic and anerobic bacteria. Resistance to the combination was not found in vitro in 45 strains of bacteria from infected surgical wounds. Marfanil and streptomycin in sterile gelatin powder were dusted on contaminated surgical wounds, as an adjuvant to proper surgery and systemic chemotherapy, after operations for acute gangrenous appendicitis, large bowel disease, and pilonidal cyst. There was a marked reduction in the incident of wound infections as compared with the controls in which this adjuvant therapy was not used. The mixture did not produce an inflammatory reaction, a collection of serum, or delay healing in wounds. The mixture has remained stable and potent for over 2 years at room temperature and does not support the growth of molds.

BOOK REVIEWS

History of Anesthesia, With Emphasis on the Nurse Specialist, by *Virginia S. Thatcher,* Editor, American Association of Nurse Anesthetist Publications. 289 pages; illustrated. J. B. Lippincott Co., publishers, Philadelphia, Pa., 1953.

The title of this book is misleading. It should be titled "History of the Nurse Anesthetist." It contains much rationalization of the nurse anesthetist's position, which is one of a technician, trying to place the nurse anesthetist in a professional medical realm. Much space is given to the premise that the art of anesthesia belongs to women. Such material is extremely controversial and has no place in a history book. The author projects much of her own feelings into the book and this tends to irritate the reader. In the chapter on "Research Goals" it is difficult to imagine a nurse anesthetist organizing a research project involving the oximeter, the electroencephalograph, the electrocardiograph, and the acoustic gas analyzer.

The book describes the historical events of anesthesia in a cursory manner. The bibliography is meager. The history of anesthesia has been better described in other books. The book does describe adequately the American Association of Nurse Anesthetists, but does not describe the role of nurses in anesthesia in Europe. The development of nurse anesthetists is of some historical interest. It is stressed that the nurse has filled in a large gap in medicine when there was no physician available. The book will have limited interest to the medical profession as a whole.—*Comdr. S. Whitehouse, MC, USN*

A Short Practice of Surgery, by *Hamilton Bailey*, F. R. C. S. (Eng.), F. A. C. S., F. I. C. S., F. R. S. E., Emeritus Surgeon, Royal Northern Hospital, London; Senior Surgeon, St. Vincent's Clinic and the Italian Hospital; Formerly External Examiner in Surgery, University of Bristol, and *R. J. McNeill Love*, M. S. (Lond.), F. R. C. S. (Eng.), F. A. C. S., F. I. C. S., Surgeon, Royal Northern, Mildmay Mission, and Metropolitan Hospitals; Consulting Surgeon, City of London Maternity Hospital; Consulting Surgeon, Potter's Bar Hospital; Associate for General Surgery, West End Hospital for Nervous Diseases; Member of Council and Court of Examiners, Erasmus Wilson Demonstrator, and Hunterian Professor, Royal College of Surgeons. With Pathological Illustrations by *L. C. D. Hermitte*, M. B., Ch. B. (Edin.) Pathologist, Royal Infirmary, Sheffield. 9th edition. 1,254 pages; 1,234 illustrations of which 272 are colored. The Williams & Wilkins Co., Baltimore, Md., publishers, 1953. Price $12.50.

In this book the authors have produced a well-written and easy-to-read survey of general surgery. The frequent references to individuals and their contributions to medicine and surgery make it interesting, particularly from a historical viewpoint. Only such material generally acceptable and up to date is included. There are many illustrations each of which emphasizes a particular diagnostic point or demonstrates certain pathologic features. Some seem a little archaic and have been observed in older textbooks. This edition includes a glossary of anatomic names. The large number of surgical diseases discussed in this textbook allows only a brief but accurate description of the disease, its diagnosis, clinical course, and an approved treatment but not detailed surgical technic. Statistics are adequate for the maintenance of interest. The appreciation of clinical signs and symptoms and the valuable assets of visual aid are emphasized. Although the book is neither intended, nor is it suitable, as a reference for the surgical specialist, it is particularly recommended for undergraduates and will stimulate them to further reading in more advanced literature.

—*Col. H. T. Berwald, MC, USA*

AN EVALUATION OF DECAMETHONIUM FOR ENDOTRACHEAL INTUBATION

JULIUS J. SNYDER, *Lieutenant Colonel, MC, USA (1)*

THE introduction of curare into clinical usage was one of the most significant advances in the field of anesthesiology. Although this agent proved to be a valuable adjunct in many situations, certain undesirable features and side effects occurred with sufficient frequency to warrant the investigation and evaluation of the synthetic muscle relaxant, decamethonium. Curare preparations may (1) unexpectedly produce sudden falls in blood pressure which are extremely dangerous in "poor risk" or elderly patients; (2) cause histamine-like substances to be released in the tissues, with an accompanying bronchoconstrictor response and, occasionally, frank bronchospasm *(2)*. Furthermore, the relaxing action of curare affects the muscles of respiration thereby producing a profound and sometimes unduly prolonged respiratory depression. For these reasons, attention has been centered on a drug that would provide adequate muscular relaxation without the dangers of histamine-like reactions and extended involvement of the respiratory muscles.

Based on the fact that d-tubocurarine contains 2 quaternary nitrogen atoms, it was postulated that the curariform activity of this compound was the result of the presence of 2 such groups at some optimal distance apart. As a result, a 10-carbon-atom, straight-chain compound was prepared, separating the quaternary nitrogen atoms. It proved to be a potent muscle relaxant and about 3 times as active as d-tubocurarine. The descriptive term "decamethonium" was adopted *(3)*.

Decamethonium has an entirely peripheral action and blocks motor impulses at the myoneural junction of skeletal muscles. This effect is a specific depolarization of the muscle membrane

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(1) 98th General Hospital, U. S. Army.

(2) Landmesser, C. M.; Converse, J. G.; and Harmel, M. H.: Quantitative evaluation of bronchoconstrictor action of curare in anesthetized patient; preliminary report. Anesthesiology 13: 275-280, May 1952.

(3) The decamethonium (syncurine) used in this investigation was supplied through the courtesy of Dr. W. P. Colvin of Burroughs Wellcome & Company, Inc., Tuchahoe, N. Y.

at the motor end-plate, thus differing from d-tubocurarine which interferes with the activity of acetylcholine. Its respiratory effects are transient when compared with curare and its derivatives. On the intravenous administration of decamethonium, muscular relaxation and respiratory depression, which occur rather suddenly, begin within a minute. The respirations return to normal within from 3 to 5 minutes (*4*). Return of muscular function has its onset a few minutes later and is complete within from 20 to 30 minutes. Prolonged apnea has been encountered following large doses of decamethonium (*5*). Anticholinesterases are of no value in overcoming the blocking effect of this muscle relaxant. In the presence of respiratory depression, supportive treatment by adequate ventilation with oxygen is indicated. Because of its short action the effects of this drug are controllable. Apnea has been observed following small doses.

In the presence of thorough oxygenation, alterations in the circulation are of little significance, even after large doses of the drug. The pulse rate and blood pressure show no appreciable changes and ECG's reveal no abnormalities that are attributable to the agent.

After respiration has returned to normal, abdominal muscular relaxation may continue for as long as 30 minutes, the degree of relaxation being directly related to the size of the dose. Transient muscular fasciculations, especially over the chest and abdomen, have been noted immediately after rapid intravenous administration of decamethonium and before any prominent degree of paralysis had developed. These spontaneous movements are attributed to an initial, direct stimulating effect of the drug. Decamethonium does not enhance the action of any of the commonly employed anesthetic agents and the effect of a given dose is constant. Ethyl ether does not augment its action. Repeated doses do not appear to have an accumulative effect and there is no habituation or increase of tolerance to the drug. Therefore, the results from a definite amount of decamethonium are predictable, and when repeated will produce identical effects in a given patient.

The action of decamethonium was not accompanied by histamine-like effects or block at autonomic ganglia (*6*) and no serious untoward results have been described. Bronchospasm and significant hypotension have not been observed with this agent. It has

(*4*) Spencer, C. H., and Coakley, C. S.: Clinical impressions of decamethonium bromide (C10) in anesthesia; preliminary report. M. Ann. District of Columbia 19: 132-135; 177, Mar. 1950.

(*5*) Harris, L. C., Jr., and Dripps, R. D.: Use of decamethonium bromide for production of muscular relaxation. Anesthesiology 11: 215-223, Mar. 1950.

(*6*) Grob, D.; Holaday, D. A.; and Harvey, A. M.: Effects of bis-trimethylammonium decane diiodide and dibromide on neuromuscular function and on induced convulsions in man. New England J. Med. 241: 812-815, Nov. 24, 1949.

been deliberately employed in patients with bronchial asthma without ill effect *(7)*. It is freely miscible and compatible in any proportion with thiopental sodium solution, which is a convenience in preparing a patient for endotracheal intubation. Following the injection of decamethonium in the unanesthetized patient, there is no alteration in the state of consciousness. Anesthesia or analgesia is not produced. The drug has been helpful in the administration of anesthesia in geriatric and pediatric patients because physiologic functions are little disturbed and the operative and recovery periods are generally uneventful.

ENDOTRACHEAL INTUBATION

The aim of the technic to be described is to achieve a smooth, atraumatic intubation of the trachea. In most instances, the untoward effects of this procedure may be attributed to imperfect or improper preparation of the patient for intubation. The adequate preparation of the patient is more important than the actual intubation *(8)*. In this connection, decamethonium has been found to be satisfactory and has several advantages over curare and the related drugs. It produces a well-relaxed musculature and reasonably consistent results can be predicted. It does not precipitate bronchial or laryngeal spasm and contributes to the relief of existing spasm. This prevents or minimizes trauma to the larynx and trachea during intubation. Decamethonium generally sustains the vocal cords in marked abduction and relaxation so that there is little or none of the straining and "bucking" that so frequently accompany the intubation of patients who are given curare preparations. It is not known whether intubation causes electrocardiographic changes in these patients, although changes have been noted in patients when reacting strongly to the insertion of the endotracheal tube *(9)*. Cardiac disturbances have also been observed at the time of extubation during light planes of anesthesia. They are fleeting in character and may be minimized by inflating the patient's lungs with 100 percent oxygen before any endotracheal manipulations *(10)*. Because topical cocainization of the larynx during general anesthesia and immediately prior to intubation appears to aggravate cardiac disorders, it was omitted during the present study, but, with the exception of endotracheal anesthesia for tonsillectomy in children, the tube

(7) Foldes, F. F., and Machaj, T. S.: Syncurine (decamethonium bromide): its use with pentothal-sodium and nitrous oxide-oxygen anesthesia in abdominal surgery. Anesthesiology 12: 366-375, May 1951.

(8) Bailey, P. J., and Murphy, F. J.: Syncurine in endotracheal intubation. Anesthesiology 12: 63-66, Jan. 1951.

(9) Burstein, C. L.; Zaino, G.; and Newman, W.: Electrocardiographic studies during endotracheal intubation; effects during general anesthesia and intravenous diethylaminoethanol. Anesthesiology 12: 411-419, July 1951.

(10) Converse, J. G.; Landmesser, C. M.; and Harmel, M. H.: Electrocardiographic changes during extubation. Anesthesiology 13: 163-168, Mar. 1952.

was lubricated with an anesthetic ointment and a cocaine solution was instilled into the trachea on completion of the intubation.

When the epiglottis is manipulated during direct laryngoscopy, an elevation in both systolic and diastolic blood pressure occurs almost immediately *(11)*. A further increase, accompanied by a tachycardia, develops after intubation of the trachea. These findings were substantiated during this study. Furthermore, the degree of disturbance was in direct proportion to the time and effort required for laryngoscopy and tracheal intubation. The blood pressure variations are not significant and are unassociated with either hypoxia or carbon dioxide retention *(12)*. Original blood pressure levels and pulse rates are resumed within a few minutes following completion of the intubation.

A combination of from 4 to 5 mg. of decamethonium and 500 mg. of a 2.5 percent solution of thiopental sodium was given to induce rapid anesthesia and to facilitate prompt endotracheal intubation. The smaller dose of decamethonium was generally reserved for women and debilitated patients, further variations being allowed for age and weight. The rate of the intravenous injection was rapid, the entire amount being given from one syringe in about 1 minute without an initial or test dose. Shortly after the patient loses consciousness, apnea develops, and adequate ventilation with oxygen is provided using controlled respirations. After the decamethonium has been injected, a minimum of 3 minutes is required for maximum drug effect and during which the pulmonary oxygen reserve is increased before intubation under direct vision is performed. This method has been used in about 200 intubations and is regarded as superior to all technics previously used. This type of induction was employed whenever endotracheal anesthesia was indicated. The age of the patients in this series ranged from 3 to 65 years, the males and females being about equal in number. A deliberate effort was made to produce apnea. In every instance this developed immediately after the completion of induction, lasting from 5 to 33 (average 20) minutes.

Thiopental sodium and decamethonium were injected intravenously in children on the basis of 2.5 mg. of thiopental sodium per pound of body weight and 1 mg. of decamethonium per 30 pounds of body weight. In these patients, the drugs were given slowly and when tonsillectomy was performed all topical anesthesia was omitted. A brief period of hyperactivity may occur toward the completion of the injection and consequently care must be taken not to dislodge the needle at that time.

(11) King, B. D.; Harris, L. C., Jr.; Greifenstein, F. E.; Elder, J. D., Jr.; and Dripps, R. D.: Reflex circulatory responses to direct laryngoscopy and tracheal intubation performed during general anesthesia. Anesthesiology 12: 556-566, Sept. 1951.

(12) Volpitto, P. P.: Experiences with ultra-short acting intravenous barbiturates combined with decamethonium bromide for endotracheal intubation. Anesthesiology 12: 648-655, Sept. 1951.

DISCUSSION

On the basis of a limited experience with decamethonium, I believe that the drug has a useful place in the preparation of the patient for endotracheal intubation and subsequent anesthesia. It is short-acting and therefore controllable. Because it does not liberate histamine and autonomic ganglia are not blocked by its action, no important circulatory changes or bronchospasm occurred during the present study. The drug does not deteriorate on standing and is readily miscible with solutions of thiopental sodium.

The combination of thiopental sodium and decamethonium has proved to be safe and superior to a combination of thiopental sodium and curare for endotracheal intubation. The period of apnea is much shorter. The technic has been found to be satisfactory for adults, children, and patients who are a "poor risk." Induction of anesthesia and its subsequent maintenance are greatly simplified by the use of this drug.

The dose of decamethonium used in this study was selected on an empirical basis and the experience of other investigators. As with all other agents, the amount required was subject to individual variation. Predictable results were not encountered with smaller doses than those recommended. The ability of decamethonium consistently and adequately to prepare the patient for endotracheal intubation is probably related to its synthetic nature in that it is standardized by physiochemical processes rather than bio-assay.

Perhaps the most gratifying experience with the decamethonium-thiopental sodium combination, when used both for endotracheal intubation and the subsequent anesthesia, was the absence of undesirable circulatory effects. In practically every instance, the blood pressure and pulse remained essentially unchanged, regardless of the duration and nature of the operation.

SUMMARY

Decamethonium-thiopental sodium combinations have been used extensively in preparing patients for endotracheal intubation with gratifying results. The technic has been readily mastered by personnel with varying degrees of experience and skill. No untoward results or complications were attributable to the method. The uneventful operative and postoperative course of these patients was remarkable, but this type of technic for endotracheal intubation should be used only by persons who are adequately trained in laryngoscopy and endotracheal intubation.

BOOK REVIEWS

Diagnostic Tests in Neurology, A Selection for Office Use, by *Robert Wartenberg,* M. D. Forewords by *Sir Gordon Holmes,* M. D., F. R. S., and *Stanley Truman,* M. D. 228 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., publishers, 1953. Price $4.50.

This small, clearly written, well-illustrated volume is intended to broaden the usefulness of the clinical neurologic examination. It has been carefully prepared to fulfill this purpose. The need for a complete, careful, and dependable neurologic examination is stressed as a way of eliminating unnecessary laboratory work. The material covers the entire central nervous system and is limited to what can be done by the examiner in the office. Many illustrations demonstrate what to look for and how to interpret these generally unused but valid methods. The book is organized to facilitate its use as a reference work and can be used with confidence. The neurologist will find nothing new here, but the physician who sees neurologic conditions only occasionally will find it very useful.—*Col. E. R. Inwood, MC, USA*

Comroe's Arthritis and Allied Conditions, edited by *Joseph Lee Hollander,* M. D., and collaborating editors *Nathan R. Abrams,* M. D.; *Victor G. Balboni,* M. D.; *Edward W. Boland,* M. D.; *Ralph H. Boots,* M. D.; *Morris A. Bowie,* M. D.; *Howard C. Coggeshall,* M. D.; *Richard H. Freyberg,* M. D.; *Wallace Graham,* M. D.; *W. Paul Holbrook,* M. D.; *John G. Kuhns,* M. D.; *John Lansbury,* M. D.; *Theodore A. Potter,* M. D.; *Charles Ragan,* M. D.; *Edward F. Rosenberg,* M. D.; *Charley J. Smyth,* M. D.; *Philip D. Wilson,* M. D.; and *Philip D. Wilson, Jr.,* M. D. 5th edition, completely revised and rewritten. 1,103 pages; 399 illustrations. Lea & Febiger, Philadelphia, Pa., publishers, 1953.

This new edition is generally similar to the previous editions, but the sections and chapters have been changed so as to bring the discussions of related conditions closer together, and nearly every chapter has been rewritten, at least in part. Entirely new chapters on corticotropin, cortisone, and hydrocortisone; intra-articular injection of hydrocortisone; and low back pain and sciatica have been added. The subject of arthritis in general, including the social, economic, and medical problems concerned are presented in an excellent manner. Each section is written by an authority. This textbook should be of great value to students, general practitioners, internists, and rheumatologists.
—*Col. W. C. Berry, MC, USA*

MUSCULAR VIABILITY IN PERIPHERAL NERVE INJURIES[1]

ELIAS M. THRONE, *Captain, MC, USA*
WALTER H. MOORE, *Captain, MC, USA*
RAOUL C. PSAKI, *Lieutenant Colonel, MC, USA*

WHEN traumatic denervation of a muscle occurs, the immediate thought is of a surgical procedure to provide anatomic continuity for nerve regeneration. An equally important responsibility of the physician is the preservation of muscular viability until reinnervation takes place. In traumatic injuries from any cause, muscular viability is important. This is emphasized by the biopsy reports of Bowden and Gutmann (2) indicating that denervation leads to the progressive shrinkage and ultimate destruction of the muscular fibers. This shrinkage and the increase of connective tissue in the muscle may become too advanced to allow recovery after the regenerating nerve reaches the muscle.

Following injury with disruption in the continuity of a peripheral nerve, the distal part undergoes a reaction of degeneration. This degeneration proceeds distally until it reaches the myoneural junction in from 14 to 21 days. When this occurs, the response of the muscle to a galvanic current changes from a brisk to a vermicular contraction and the response to a faradic current at ordinary intensities is lost. These 2 responses are the basic features of electrical diagnosis (3).

By the use of interrupted galvanic current of definite intensity, frequency, and duration, the physician has a battery of tests which will determine such things as rheobase, chronaxie, strength duration curve, response to repetitive stimuli, and cathodal tetanus ratio of the muscle tested. These tests will indicate whether the peripheral nerve to a muscle is normal, degenerating, completely degenerated, or regenerating. The response to faradic stimulation is only useful to determine whether or not the muscle is denervated. It is of no benefit in following the regenerative

(1) Letterman Army Hospital, San Francisco, Calif.

(2) Bowden, R. E. M., and Gutmann, E.: Denervation and re-innervation of human voluntary muscle. Brain 67: 273-313, Dec. 1944.

(3) Kovács, R.: Electrotherapy and Light Therapy With Essentials of Hydrotherapy and Mechanotherapy. 6th edition. Lea & Febiger, Philadelphia, Pa., 1949.

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process of a peripheral nerve. On the other hand, tests with interrupted galvanic current can frequently show early regeneration of a peripheral motor nerve several weeks before any subjective voluntary muscular contraction occurs. Even though the spread in the repetitive stimuli remains wide, the strength duration curve, high and steep, and the chronaxie, elevated, an increase in the rheobase and tetanus ratio over the previous denervation reading indicates neurotization. A further increase in tetanus ratio with flattening of the right-hand portion of the curve and discontinuities in the curve indicates maturation. A decrease in the spread of the repetitive stimuli at this time is confirmatory evidence of maturation.

The electromyograph is also useful in following changes in muscle, not only in regard to viability of the muscle but also in following the regeneration of the nerve. When denervation takes place, the muscular fibers become sensitive to acetylcholine, which causes them to fibrillate. Therefore the finding of fibrillation potentials on the electromyogram is evidence that denervation exists. According to Golseth *(4)*, the presence of these fibrillations in denervated skeletal muscle shows that there is contractile tissue having the capacity for reinnervation. When fibrillation potentials occur less frequently in serial electromyograms, either regeneration of the nerve or degeneration of the muscular fibers with encroachment of fibrous tissue is taking place. If fibrosis is not occurring in the muscle, then the gradual disappearance of the fibrillation voltages is presumptive evidence of neurotization. The continuation of this process with the appearance of complex motor unit potentials is indicative of maturation.

We are deeply concerned with this fibrosis or loss of viability. Although inadequate blood supply may predispose to muscle fibrosis *(5)*, we believe that in many patients with an intact blood supply denervation is the only lesion truly affecting the muscle. It would be futile to have regeneration of the nerve occur, whether spontaneously or following neurorrhaphy or neurolysis, if nothing but connective tissue remained where once a muscle existed. Regeneration of the nerve to a viable muscle would also be useless if the joint controlled by the muscle were ankylosed. The technics for maintaining joint mobility are readily recognized but the therapeutic procedures necessary to maintain muscular viability are not so readily recognized. Furthermore, we believe the medical profession in general is less cognizant of this problem.

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(4) Golseth, J. G.: Personal communication.

(5) Psaki, R. C., and Schields, C. D.: Ischemic necrosis of anterior tibial muscle; report of case. Arch. Phys. Med. 33: 153-155, Mar. 1952.

The use of electrical stimulation must be based on the preservation of contractile elements of muscle as there is no experimental evidence that it influences the regenerative process of the motor nerve. The value of electrotherapy has been demonstrated by several workers *(6-23)*. Fischer *(24)* and Fischer and Ramsey *(25, 26)* showed that the retardation of weight loss of

(6) Fischer, E.: Effect of faradic and galvanic stimulation upon course of atrophy in denervated skeletal muscles. Am. J. Physiol. 127: 605-619, Nov. 1939.

(7) Gutmann, E., and Guttmann, L.: Effect of electrotherapy on denervated muscles in rabbits. Lancet 1: 169-170, Feb. 7, 1942.

(8) Langley, J. N., and Hashimoto, M.: Observations on atrophy of denervated muscle. Am. J. Physiol. 49: 432, 1914-1915.

(9) Grodins, F. S.; Osborne, S. L.; Johnson, F. R.; and Ivy, A. C.: Stimulation of denervated skeletal muscle with alternating current. Am. J. Physiol. 142: 216-221, Sept. 1944.

(10) Grodins, F. S., et al.: Effect of appropriate electrical stimulation on atrophy of denervated skeletal muscle in rat. Am. J. Physiol. 142: 222-230, Sept. 1944.

(11) Kosman, A. J.; Osborne, S. L.; and Ivy, A. C.: Effect of electrical stimulation upon course of atrophy and recovery of gastrocnemius of rat. Am. J. Physiol. 145: 447-451, Feb. 1946.

(12) Kosman, A. J.; Wood, E. C.; and Osborne, S. L.: Effect of electrical stimulation upon atrophy of partially denervated skeletal muscle of rat. Am. J. Physiol. 154: 451-454, Sept. 1948.

(13) Kosman, A. J.; Osborne, S. L.; and Ivy, A. C.: Importance of current form and frequency in electrical stimulation of muscles; studies in retardation of muscle atrophy in dog. Arch. Phys. Med. 29: 559-562, Sept. 1948.

(14) Hines, H. M.: Effects of immobilization and activity on neuromuscular regeneration. J. A. M. A. 120: 515-517, Oct. 17, 1942.

(15) Hines, H. M.: Physiologic basis for treatment of paralyzed muscle. Arch. Phys. Therapy 24: 69-73, Feb. 1943.

(16) Hines, H. M.; Thomson, J. D.; and Lazere, B.: Quantitative studies on muscle and nerve regeneration in rat. Am. J. Physiol. 137: 527-532, Oct. 1942.

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(18) Wehrmacher, W. H.; Thomson, J. D.; and Hines, H. M.: Effects of electrical stimulation on denervated skeletal muscle. Arch. Phys. Med. 26: 261-266, May 1945.

(19) Eccles, J. C.: Investigations on muscle atrophies arising from disuse and tenotomy. J. Physiol. 103: 253-266, Dec. 15, 1944.

(20) Jackson, S. (Oxford): Role of galvanism in treatment of denervated voluntary muscle in man. Brain 68: 300-330, Dec. 1945.

(21) Pollock, L. J.; Arieff, A. J.; Sherman, I. C.; Schiller, M.; Tigay, E.; Hiller, F.; Liebert, E.; and Yacorzynski, G. K.: Electrotherapy in experimentally produced lesions of peripheral nerves. Arch. Phys. Med. 32: 377-387, June 1951.

(22) Osborne, S. L.: Retardation of atrophy in man by electrical stimulation of muscles. Arch. Phys. Med. 32: 523-528, Aug. 1951.

(23) Solandt, D. Y.; DeLury, D. B.; and Hunter, J.: Effect of electrical stimulation on atrophy of denervated skeletal muscle. Arch. Neurol. & Psychiat. 49: 802-807, June 1943.

(24) Fischer, E. (Richmond, Va.): Some enzyme systems of denervated muscle. Arch. Phys. Med. 29: 291-300, May 1948.

(25) Fischer, E. (Richmond, Va.), and Ramsey, V. W.: Changes in protein content and in some physicochemical properties of protein during muscular atrophies of various types. Am. J. Physiol. 145: 571-582, Feb. 1946.

(26) Fischer, E. (Richmond, Va.), and Ramsey, V. W.: Effect of daily electrical stimulation of normal and denervated muscles upon their protein content and upon some of the physiocochemical properties of protein. Am. J. Physiol. 145: 583-586, Feb. 1946.

muscle is accompanied by a retardation of the loss of adenosinetriphosphatase activity. They also reported that after denervation of the gastrocnemius muscles of a rabbit, myosin decreases considerably with progressive atrophy. Like the weight loss, this deterioration of muscular protein is retarded by appropriate muscular stimulation. Thus adenosinetriphosphatase diminishes because of disuse of this enzymatic system, finally leading to deterioration of the myosin.

Potassium also plays an important role in muscular metabolism. The contractile power of muscle is affected by a decrease of the potassium concentration in its fibers. Fenn *(27)* showed that besides this direct involvement in the contractile mechanism, potassium apparently aids in keeping myosin in its proper colloidal state so that the folding of the myosin chain molecules can occur. This causes shortening of the muscle. A relationship between denervation atrophy of muscle and potassium loss was also presented by Fischer *(28)*. He showed a fairly constant ratio between extractable myosin and loss of potassium and noted that daily electrical stimulation of the denervated muscle prevented loss of potassium. This preservation of muscular potassium is further evidence of the value of electrical stimulation.

DISCUSSION

The ultimate result of muscular denervation is complete loss of viability of the muscular fiber and encroachment by fibrous tissue, unless reinnervation takes place. In peripheral nerve injuries there is often a partial irreversible muscular degeneration before reinnervation occurs. Because viable muscle is critical in the recovery of function, the importance of maintaining it should probably be rated along with the treatment of fractures or the surgical treatment of injured nerves. Measures to insure muscular viability should be instituted early and used continuously until regeneration of the nerve occurs. If there is a minimal loss of muscular viability with its accompanying fibrosis scattered through the muscle, the prognosis becomes poor. Fibrosis creates barriers which isolate viable muscular fibers from regenerating nerve axons. This is shown by the finding of fibrillation potentials in the electromyogram long after a muscle resumes voluntary contraction. We have observed this on numerous occasions and it has been reported by Weddell et al. *(29)*. Following nerve suture, Bowden and Gutmann *(2)* demonstrated

(27) Fenn, W. O.: Contractility. In Höber, R., et al.: Physical Chemistry of Cells and Tissues. The Blakiston Co., Philadelphia, Pa., 1945.

(28) Fischer, E.: Potassium in denervated, treated and nontreated muscle. Arch. Phys. Med. 30: 375-382, June 1949.

(29) Weddell, G.; Feinstein, B.; and Pattle, R. E.: Electrical activity of voluntary muscle in man under normal and pathological conditions. Brain 67: 178-257, Sept. 1944.

by biopsy, abundant nerve fibers in severely fibrotic muscles which had no voluntary contraction.

The present methods of maintaining muscular viability are subject to further investigation. Those currently used include: (1) early and adequate surgical care, (2) support of the involved extremity with adequate functional bracing allowing for joint motion, (3) adequate nutrition of the patient, and (4) electrical stimulation of the involved muscles. Of these, the one specific measure directed at muscular viability is electrical stimulation. The type of current is unimportant. The main point is that adequate contraction be made to occur.

SUMMARY

Therapy directed toward maintaining muscular viability should be started as early as is medically feasible and continued through the period of denervation and reinnervation. The importance of early and continuous treatment of denervated muscles should be given equal consideration with the management of fractures and the surgical treatment of injured nerves.

BOOK REVIEWS

Principles and Technique of Exodontia, by *Frank Wendell Rounds*, A. B., D. D. S., Sc. D. (Hon.), Late Dental Surgeon to Brooks Hospital; Courtesy Staff, Phillips House, Massachusetts General Hospital; Diplomate, American Board of Oral Surgeons; Past President of the American Society of Oral Surgeons and of the American Academy of Dental Science; Formerly Professor of Oral Surgery and Anesthesia, Louisville College of Dentistry, and *Charles Elder Rounds*. A. B., D. M. D., Assistant Dental Surgeon, Massachusetts General Hospital; Visiting Instructor in Oral Surgery, Tufts Dental School. 407 pages; illustrated. The C. V. Mosby Co., St. Louis, Mo., publishers, 1953. Price $10.

The "how," not the "why" of exodontia is the primary aim of the authors in this new text. It is particularly designed for use by the undergraduate and the general practitioner, as it includes many of the small details of operative technic which are so frequently omitted in older texts. Although some parts tend to be repetitious, the author probably believed that this was necessary to impress the intended reader with essential details. Excellent descriptions of the technical details involved when dealing with impacted teeth, as well as a discussion of radiographic interpretation have been included, and all phases of the subject matter are well illustrated by photographs and sketches.

—Comdr. A. S. Turville, DC, USN

United States Army in World War II. The Technical Services, the Quartermaster Corps: Organization, Supply, and Services, by *Erna Risch.* Vol. I. *Office of the Chief of Military History, Department of the Army,* Washington, D. C. 418 pages; illustrated. U. S. Government Printing Office, Washington, D. C., publishers, 1953. Price $3.25.

This is the latest volume in the series U. S. Army in World War II, and is the first in a group of 4 dealing with the Quartermaster Corps. It depicts the activities of the corps in the zone of the interior during the period of rapid expansion and administrative readjustments brought on by the war. The tremendous accomplishments of the corps are described without boast, and the miscalculations that were made are related without apology. This book contains much material of interest to Medical Service personnel such as that relating to nutrition, field sanitation, clothing, and shelter. Of broader interest is the clear demonstration that peacetime organization must be easily adaptable to mobilization needs, that continuous military research is essential, and that planning must be conducted with vision and realism.—*Col. C. O. Bruce, MC, USA*

Medical Biographies, The Ailments of Thirty-three Famous Persons, by *Philip Marshall Dale,* M. D. 259 pages; illustrated. University of Oklahoma Press, Norman, Okla., publishers, 1952. Price $4.

"What I have tried to do is to illuminate a dark corner of legitimate biography, in a few select instances, with the light of medical understanding." The author's success in reaching this goal is demonstrated in the 33 sketches dealing with ailments of well-known historical personages. Each sketch forms an independent unit. Although one may not necessarily comprehend the compelling force of Napoleon's lust for power or Byron's genius, the common bond of pain and death will generate compassion for the strutting little corporal with peptic ulcer and the handsome poet whose brain was congested, whose heart "was enlarged, flabby, and the ventricular walls thin." The persons discussed take on a new dimension of reality for the reader. He is impressed with the fact that in our time the life span of certain of them —Keats, for example—could have been lengthened by medical science, and he admits that "death is undeniable and unalterable," coming alike to philosopher, statesman, and scientist, yet recognizes with the author that "he who conquers the fear of death has in a humanistic sense, conquered death itself." This is a volume which might well be put to good use in the doctor's waiting room.—*M. M. Link, Ph. D.*

PARACOLON CARRIERS AMONG FOOD HANDLERS

EVELYN K. TATSUNO, B. Sc. (1)

O. A. BUSHNELL, *Major, MSC, USAR* (2)

ORGANISMS belonging to the genus paracolobactrum are said to be intermediate between the coliform organisms and species of salmonella and shigella. They differ from the coliform bacilli by their consistently late fermentation of lactose or by their failure to ferment it at all, and from the salmonellas and shigellas by fermenting lactose, sucrose, or salicin. Three species have been reported: (1) *Paracolobactrum aerogenoides*, resembling *Aerobacter aerogenes* and *Aerobacter cloacae;* (2) *Paracolobactrum intermedium,* resembling *Escherichia freundii* and *Escherichia intermedium;* and (3) *Paracolobactrum coliforme,* resembling *Escherichia coli.* For man, certain strains are pathogenic, certain other strains are suspected of being pathogenic, and some are thought to be nonpathogenic (3-5).

Because of the possibility that the paracolon bacteria may cause enteric disease, and in an effort to determine their incidence in a normal "healthy" population on Oahu, Hawaii, a survey for the presence of paracolon organisms in a particular occupational group was conducted. The group surveyed was made up of civilian and military food handlers employed at military installations on Oahu. The stool specimens were sent to Tripler Army Hospital in Honolulu for the required periodic examinations for enteric pathogens and for parasites and ova. Of the many specimens received at the hospital laboratory, 100, selected at random, were used in this study. Apparently this is the first survey of this kind undertaken in Hawaii.

METHODS

The usual methods employed by clinical bacteriologists for the isolation, purification, and study of suspected pathogens

(1) Intern in Medical Technology at Tripler Army Hospital, 1952-1953, when material for this paper was gathered.

(2) University of Hawaii, Honolulu, Hawaii.

(3) Stuart, C. A., and Rustigian, R.: Further studies on one type of paracolon organism. Am. J. Pub. Health 33: 1323-1325, Nov. 1943.

(4) Barnes, L. A., and Cherry, W. B.: Group of paracolon organisms having apparent pathogenicity. Am. J. Pub. Health 36: 481-483, May 1946.

(5) Frobisher, M., Jr.: Fundamentals of Bacteriology. W. B. Saunders Co., Philadelphia, Pa., 1950.

were used. Selenite-F broth or tetrathionate broth were used as the enrichment media. SS agar and desoxycholate-citrate-lactose-sucrose agar were used concurrently as the plating media. Colonies suspected of being nonlactose fermenters were purified on Levine's E. M. B. agar and MacConkey agar plates. More than 1 suspected colony was picked when they showed different colonial characteristics. Smears of the purified cultures were gram-stained, and all gram-negative bacilli were maintained on slants of stock culture agar (Difco). The criteria for identification of the paracolon organisms are those offered by students of the group *(3, 4)* and summarized by Bergey *(6)*. Serologic confirmation, using specific antiserum, was possible for *P. intermedium* strains only.

RESULTS

Of the 100 stool specimens examined, 36 percent were positive for paracolon organisms; 17 percent were positive for *P. aerogenoides;* 12 percent were positive for *P. intermedium*; 2 percent were positive for *P. coliforme*; and 5 percent were positive for both *P. aerogenoides* and *P. intermedium*. Suspected organisms were found to belong to genera other than paracolobactrum and, on further study, were attributed in most cases to the genera alcaligenes, pseudomonas, or proteus. Some specimens which yielded paracolon organisms also harbored salmonella or shigella species. The results of the survey for salmonellas and shigellas are not included in this report.

Of the 17 specimens positive for *P. intermedium,* 4 had organisms with IMVIC reactions similar to those of *E. freundii;* 12 had organisms with IMVIC reactions similar to those of *E. intermedium*; and 1 had organisms of both types.

After grouping the organisms according to their IMVIC reactions, the usual biochemical tests coincided well with the reactions listed for the several species of paracolobactrum in Bergey's manual. An exception was found in the reversal of the hydrogen sulfide production reactions in the *P. intermedium* group. A few of the inevitable variations occurred in the reactions of the sugar fermentation tests for strains of each of the 3 groups. There was no consistency in the test for delayed urease production except that the *P. coliforme* group did not produce urease.

The possibility that the suspected paracolon organisms may belong to either the salmonella or the shigella group is removed by their reactions on Simmons' citrate agar, their production of indole, and their ability to produce gas. (The salmonella species

(6) Breed, R. S.; Murray, E. G. D.; and Hitchens, A. P.: Bergey's Manual of Determinative Bacteriology. 6th edition. Williams & Wilkins Co., Baltimore, Md. 1948. p. 460.

do not produce indole and do not utilize citrate as their source of carbon.) All of the suspected paracolon strains produced positive reactions on either or both of these test media. The production of gas in at least 1 sugar fermentation reaction eliminated the possibility of the suspects being shigella species.

Three organisms in the *P. intermedium* group showed strong agglutination when tested with a polyvalent salmonella antiserum. (No antiserums were available for studying the other paracolon strains, so no serologic confirmation of cultural reactions could be made.)

CONCLUSIONS

The incidence of paracolon organisms in a group of 100 food handlers distributed among several military installations on the island of Oahu was found to be 36 percent. *P. aerogenoides* was the species most commonly found, *P. intermedium* was next, and *P. coliforme* was least commonly encountered. Dual occurrences were observed in 5 percent. The possibility that these carriers of potential pathogens might act as sources of infection cannot be discounted.

BOOK REVIEWS

Problems of Infancy and Childhood, Transactions of the Sixth Conference March 17 and 18, 1952, New York, N. Y., edited by *Milton J. E. Senn,* M. D., Sterling Professor of Pediatrics and Psychiatry, Yale University School of Medicine, New Haven, Conn. Sponsored by the *Josiah Macy, Jr. Foundation,* New York, N. Y. 160 pages. Printed by Foundation Press, Inc., Packanack Lake, N. J., 1953. Price $2.50.

This small volume might better have been titled "The Problem of Understanding Infancy and Childhood." The conference here reported consisted of 3 presentations followed by free discussion. Dr. Escalona spoke on her observations and tentative conclusions regarding the emotional development in the first year of life; Dr. Wolf presented observations of individual tendencies in the first year of life; and Dr. Stewart spoke on excessive crying in infants. An increasing respect for the individuality of the infant in terms of his inherent constitution as well as his total environment was evident in the discussions and, although no firm conclusions were reached, an understanding of the problems of infancy and childhood appears to be growing. An interesting and informative review of World Health Organization activities was presented by Dr. Kjellbery, Maternal and Child Health Regional

Officer for Europe, World Health Organization. This book is heartily recommended to all who are interested in the problems of infancy and childhood.—*Lt. Comdr. R. E. Switzer, MC, USN*

Ménière's Disease, by *Henry L. Williams*, M. D., M. S. in Otol., Head of Section of Otolaryngology and Rhinology, Mayo Clinic; Professor of Otolaryngology and Rhinology, Mayo Foundation; Graduate School of University of Minnesota, Rochester, Minn. American Lecture Series, Publication Number 129, A Monograph in the Bannerstone Division of American Lectures in Otolaryngology, Audiology and Broncho-Esophagology, edited by *Norton Canfield*, M. D., Associate Clinical Professor of Otolaryngology, Yale University School of Medicine, New Haven, Conn. 349 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1952. Price $7.

This is the most complete work published in recent years on Ménière's disease. An exhaustive bibliography and review of the literature is presented. The author has given due attention to the points of confusion in the recognition and treatment of this disease. In the first chapter, he evaluates the subject as Ménière presented it and defends his conception of the symptom complex. The anatomy and physiology of the labrynth is discussed in minute detail. Similarly the cause, pathology, and diagnosis are described with great care. Perhaps the greatest value of this monograph lies in the section devoted to treatment. Many patients have been found to respond to quite simple medical measures. The author believes that the disorder is an allergy of the so-called physical type. "Therapy directed toward connecting this theoretical autonomic imbalance, particularly the use of the recently introduced cholinerogolytic drugs, has been highly successful in producing symptomatic relief." In medical failures of the "dangerous utricular attacks" he advises one of the surgical procedures aimed at destroying the labrynth.

—*Comdr. J. A. Fields, MC, USN*

A METHOD FOR SCREENING NONPATHOGENS IN FECES (1)

ARVEY C. SANDERS, *Lieutenant Colonel, MSC, USA* (2)

KENZO OKABE, *Ph. D.*

THE desirability of a method for handling large numbers of stool cultures when surveying for enteric pathogens has long been recognized. This need became particularly urgent in the early days of the Korean campaign because the occurrence of acute enteritis placed a severe workload on the facilities of a medical general laboratory (3). A method was developed under emergency conditions which has withstood the test of continued use (4, 5).

Following the onset of hostilities in Korea it was not unusual to receive 200 stools per day for culture. The conventional methods used in screening these specimens for enteric pathogens were almost prohibitive from the standpoint of time, space, and materiel requirements. Routine definitive methods are designed to remove concomitant intestinal flora such as escherichia, proteus, and paracolobactrum, so that the nonlactose and nonsucrose fermenting group of organisms can be biochemically and serologically identified. In this laboratory, established procedure had required that fecal material be streaked on salmonella-shigella (SS) and MacConkey's agar plates.

After from 18 to 24 hours of incubation, suspected colonies were selected and transferred to a tryptose-phosphate broth designed to enhance their growth preparatory to the inoculation of Kligler's iron agar, citrate agar, and motility medium. Because experience in the Far East had shown occurrence of multiple infections in individual patients or outbreaks (4, 6), several

(1) 406th Medical General Laboratory, U. S. Army.

(2) Present address: Army Medical Service Graduate School, Walter Reed Army Medical Center, Washington, D. C.

(3) Hardy, A. V.; Mason, R. P.; and Martin, G. A.: Dysenteries in Armed Forces. Am. J. Trop. Med. 1: 171-175, Jan. 1952.

(4) Zimmerman, L. E.; Cooper, M.; and Graber, C. D.: Bacteriologic studies in epidemic of bacillary dysentery in Korea; serotypes of shigella and salmonella recovered and bacteriologic response to sulfadiazine, chloramphenicol, terramycin, aureomycin, and streptomycin. Am. J. Clin. Path. 22: 549-557, June 1952.

(5) Hardy, A. V.: Personal communication, 1952.

(6) Elrod, R. P.; Sanders, A. C.; and Hullinghorst, R. L.: Isolation of 3 "Shigella paradysenteriae" serotypes from 1 patient. U. S. Armed Forces M. J. 1: 1299-1300, Nov. 1950.

colonies were selected in each case for study. As many as 3 distinct serotypes at times were isolated from a single patient. Accordingly, after from 18 to 24 hours of incubation, a minimum of 10 morphologically suspected colonies (5 from SS and 5 from MacConkey's agar) were selected from the initial cultures. If 4 differential substrates were inoculated with each of the 10 colonies selected, it would result in 8,000 tubes of differential media being required daily for the handling of 200 specimens.

A medium was desired which would eliminate the lactose-sucrose-fermenting group of intestinal organisms prior to the inoculation of differential substrates. This could be accomplished by combining a tryptose-phosphate "booster" broth with a basic biochemical screening system allowing growth of enteric organisms, and early elimination of aerobacter, proteus, and virtually all of the paracolon group. Such a medium incorporating lactose and sucrose was prepared as follows:

Tryptose	20.0 grams
Dibasic sodium phosphate	1.0 gram
Sodium chloride	5.0 grams
Bromcresol purple (1.6%)	0.5 ml.
Water, distilled	1,000 ml.

Autoclave the basic medium at 15 pounds pressure for 15 minutes.

Allow to cool, and aseptically add:

Lactose (difco concentrate, 10%)	10 ml.
Sucrose (difco concentrate, 10%)	10 ml.

Nonlactose-fermenting colonies are picked from the SS and MacConkey's agar plates, and transferred directly to the lactose-sucrose broth described above. All tubes are incubated overnight (from 15 to 18 hours) after which the acid cultures are discarded, but caution must be exercised to preclude the elimination of sucrose-fermenting *Vibrio comma*. The nonacid cultures are transferred to the various differential substrates and identified in the usual manner. Indole reactions are not impaired by this carbohydrate broth.

Use of this double sugar booster medium is somewhat different from the usual practices of isolating enteric pathogens in that it makes available certain biochemical data prior to the testing for other differential reactions. In the preliminary testing, 90 strains of salmonella and 62 strains of shigella were used to check the reactions of this medium. These strains, representing virtually all serotypes, were freshly isolated from patients under-

going treatment in Japanese hospitals. None, except *Shigella ceylonensis,* produced an acid reaction. The late lactose-fermenting coliform organisms were likewise tested, and all produced acid reactions after overnight incubation. It was possible in this experimental series to eliminate more than 50 percent of the colonies initially selected as possibly pathogenic. When the use of this medium was adopted as a standard procedure, 1,502 lactose-sucrose fermenters (proteus, aerobacter, paracolobactrum) were eliminated from 3,272 initially suspected colonies, thus allowing a corresponding reduction in further identification. Similar results have been subsequently obtained by Hardy *(5)* and Zimmerman et al. *(4)* in extensive field use of this lactose-sucrose booster broth.

SUMMARY

Overnight incubation with a booster broth medium containing lactose and sucrose provides for the elimination of 50 percent of the possibly pathogenic nonlactose-fermenting colonies selected from the initial plating media prior to the inoculation of various differential substrates. Use of this medium in large-scale bacteriologic studies of enteric disease outbreaks has allowed efficient, accurate, and economic handling of large numbers of fecal specimens.

BOOK REVIEW

Pathology of the Heart, edited by *S. E. Gould,* M. D., D. Sc., Clinical Professor of Pathology, Wayne University College of Medicine, Detroit, Mich.; Pathologist, Wayne County General Hospital, Eloise, Mich.; Consultant in Pathology, Veterans Administration Hospital, Dearborn, Mich.; Editor, American Journal of Clinical Pathology. 1023 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1953. Price $25.50.

The publication of this book at a time when so much emphasis is being put on heart disease is opportune. If for no other reason than to present in one volume an edited collection of available factual data about the heart, this is a valuable contribution to medical literature. The editor and his collaborators, all of whom have qualifications that make their contributions authoritative, have put these data together clearly, concisely, and readably. Starting with a historical chapter and ending with an appendix, containing detailed instructions for gross examination of the heart together with weights and measurements, the following chapter headings are included: The Development of the Heart,

The Structure of the Adult Heart, Physiology of the Heart, Congenital Malformations of the Heart and Great Vessels, Degenerative Diseases, Vascular Lesions of the Heart, Rheumatic Disease of the Heart, Nonrheumatic Inflammatory Diseases of the Heart, Parasitic Diseases of the Heart, Injuries of the Heart and Pericardium by Physical Violence, Neoplasms of the Pericardium and Heart, and Clinicopathologic Correlations.

Outlines of the material presented are used at the beginning of each chapter, a practice that makes it easy to look up data for reference and to summarize the contents. Illustrations in black and white and in color are used effectively throughout the book, as are tabulations of pertinent data in many of the chapters. Extensive bibliographies regarding each subject presented are placed in chronological order at the end of each chapter. This manner of presentation makes it easy to use these bibliographies. Complete author and subject indexes are included. The print is exceptionally clear. The binding and the cover of Du Pont fabrikoid are excellent.

One must be hypercritical to find points to which to take exception, and this reviewer finds none that he considers significant. Recognizing that concessions must be made to a living language but with no challenge to the etymologic correctness, it might be better to describe endothelium as "squamous mesenchymal epithelium" rather than "a simple squamous epithelium," inasmuch as the term "squamous epithelium" may connote an epidermoid structure to many readers. The occurrence of tricuspid endocarditis in narcotic addicts who develop blood stream infections with staphylococcus is not mentioned, nor is this association included in the discussion of the factors of localization in bacterial endocarditis. A difference of opinion is expressed in the chapters on rheumatic heart disease and on nonrheumatic inflammatory diseases of the heart as to whether or not mural endocarditis of the ventricles occurs in rheumatic fever. These things are minor, however, and do not detract from the value of the book.

No better summation of a critique of this work can be made than is given in the foreword by Howard T. Karsner, M. D.: "This book is a superb contribution to the literature of pathology, medicine, and biology, and should be welcomed in the special field of cardiology."—*Comdr. W. F. Pierce, MC, USN*

MODIFICATION OF THE DEPTH PERCEPTION APPARATUS

PHILIP A. PETER, *Captain, USAF (MC)* (1)

A large number of candidates for drivers' licenses, as well as an increasing number of aviation cadet applicants and aircrewmen are examined daily in the eye clinic of this hospital. The stereopsis test, performed with the standard issue Depth Perception Apparatus (#3-247-500 Armed Services Catalog of Medical Materiel), is given both drivers and flying personnel. In their eagerness to qualify for flying training or to continue on

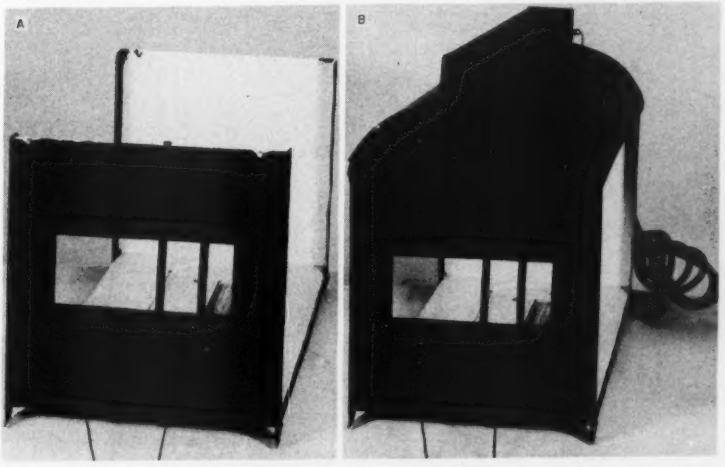

Figure 1. The standard issue depth perception apparatus (A) *before and* (B) *after modification.*

flying status, many examinees are anxious to find extraneous clues to stereopsis, such as shadows, to assist them in satisfactorily passing the depth perception test. This report describes a simple and inexpensive modification of the issued item by which a more accurate test can be performed and much time saved.

In the standard apparatus (fig. 1a) there are no provisions for a shadowproof light or means of excluding from the examinee the

(1) U. S. Air Force Hospital, Francis E. Warren Air Force Base, Wyo.

visualization of the pins over the top of the front surface. The apparatus is modified (fig. 1b) by suspending a shadow-proof fluorescent light a short distance above the pins of visual fixation and adding a cover on top. Painting the background sur-

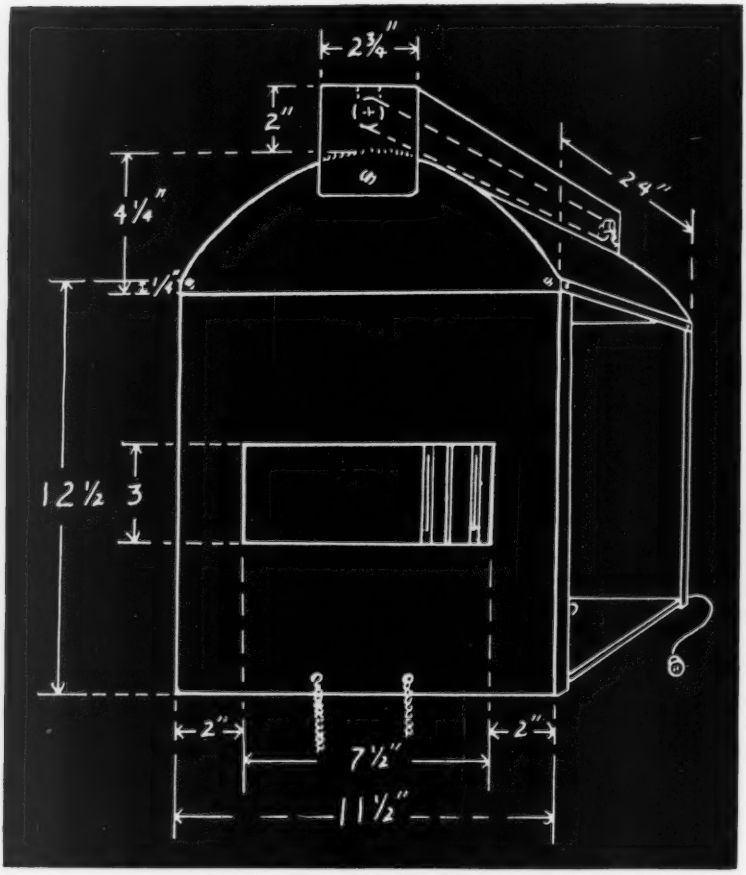

Figure 2. Drawing showing the measurements of construction of the modified standard depth perception apparatus.

face and the inside of the roof with a low-reflecting white paint, makes the apparatus more accurate.

The measurements for constructing the top and lighting unit are given in figure 2. Figure 3 shows the basic measurements of the unmodified apparatus. The top consists of 2 semicircular sheets of scrap tin (with holes for mounting) on each end of the

apparatus, a rectangular tin box to house a 10-watt fluorescent light and its vibrator unit, and 2 flat sheets of tin to complete the cover. The roof may be detached simply by removing the 4 corner bolts.

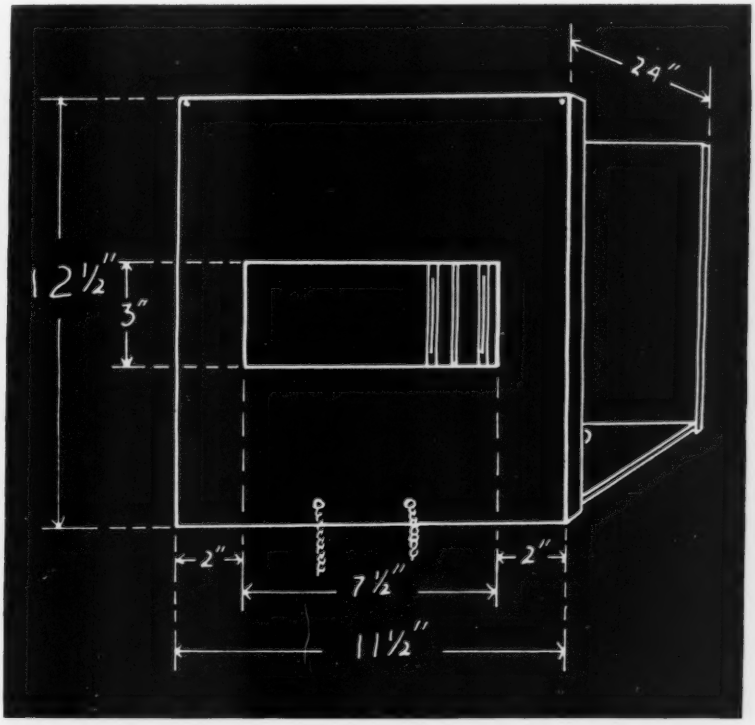

Figure 3. Drawing showing measurements of construction of the standard depth perception apparatus.

As compared to the standard apparatus, the modified apparatus has proved to be: (1) more intensely and uniformly illuminated; (2) less confusing to the examinee because fewer moving parts are visible; (3) more accurate because of the absence of extraneous clues to depth, such as shadows, irregular light reflexes, and visualization of the tops of the pins; and (4) more stable.

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Functional and Surgical Anatomy of the Hand, by *Emanuel B. Kaplan,* M. D., F. A. C. S., Assistant Professor of Anatomy, College of Physicians and Surgeons, Columbia University; Attending Orthopedic Surgeon of the Hospital for Joint Diseases; Attending Orthopedic Surgeon of the Lebanon Hospital; Medical Director, Beth Abraham Home, New York, N. Y. 288 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., publishers, 1953. Price $10.

Heart and Circulation, Diagnosis and Treatment, by *Meyer Sclar,* M. D., F. A. C. C., Chief in Cardiology and Senior Attending Physician, Unity Hospital; Consultant in Cardiology, Rockaway Beach Hospital and Madison Park Hospital; Associate Attending in Medicine and Cardiology, Kings County Hospital, Brooklyn, N. Y. Assisted by *Jacob Melnick,* M. D. 357 pages; illustrated. Froben Press, Inc., New York, N. Y., publishers, 1953. Price $7.50.

Office Orthopedics, by *Lewis Cozen,* M. D., F. A. C. S., Attending Orthopedic Staff, The Orthopedic Hospital, Veteran's Hospital, Los Angeles County Hospital, Cedars of Lebanon Hospital, Los Angeles, and Los Angeles Tuberculosis Sanitarium, Monrovia, Calif.; Assistant Professor of Orthopedic Surgery, College of Medical Evangelists, Los Angeles. 304 pages; illustrated. 2d edition, enlarged and revised. Lea & Febiger, Philadelphia, Pa., publishers, 1953. Price $5.50.

Contact Dermatitis, by *George L. Waldbott,* M. D., F. A. A. A., F. A. C. A., F. I. A. A., F. A. C. P., Senior Physician, Harper Hospital; Chief of Division of Allergy, Assistant Physician, Grace Hospital; Chief of Allergy Clinic, Formerly, Director of Allergy Clinic, Children's Hospital of Michigan, Formerly, Consultant Allergist, St. Mary's Hospital and North End Clinic, Detroit, Mich. American Lecture Series, Publication No. 133, A Monograph in The Bannerstone Division of American Lectures in Dermatology, edited by *Arthur C. Curtis,* M. D., Chairman, Department of Dermatology and Syphilology, University of Michigan, Ann Arbor, Mich. 218 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1953.

The Roots of Psychotherapy, by *Carl A. Whitaker,* M. A., M. D., Professor of Psychiatry and Chairman of the Department of Psychiatry, Emory University School of Medicine, and *Thomas P. Malone,* M. A., Ph. D., Assistant Professor of Psychiatry and Director of Research, Department of Psychiatry, Emory University School of Medicine. 236 pages; illustrated. The Blakiston Co., New York, N. Y., publishers, 1953. Price $4.50.

TREATMENT OF CRYPTOCOCCOSIS WITH TERRAMYCIN(1)

BEN D. HALL, *Captain, MC, USA*

RICHARD E. MARDIS, *Major, MC, USA*

REPORTS of cryptococcosis, a relatively rare fungus disease due to *Cryptococcus neoformans* with predilection for the lungs, brain, and meninges, have appeared in the literature periodically since 1902. Reviews of the literature published in 1950 mention 127 (2), 165 (3), and over 200 (4) cases reported up to that time. Accepting Mosberg and Arnold's (5) figure of 172 cases of cryptococcosis of the central nervous system and adding cases reported subsequently (2-4), (6-12), the total (including our case) is at least 189. The following case illustrates: (1) a common pitfall in the differential diagnosis; (2) early pleural involvement, an unusual finding; and (3) the failure of terramycin together with conventional therapy to alter the course and fatal outcome of the disease.

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(1) From Tripler Army Hospital, Honolulu, T. H.

(2) Ratcliffe, H. E., and Cook, W. R.: Cryptococcosis; review of literature and report of case with initial pulmonary findings. U. S. Armed Forces M. J. 1: 957-969, Sept. 1950.

(3) Gendel, B. R.; Ende, M.; and Norman, S. L.: Cryptococcosis; review with special reference to apparent association with Hodgkin's disease. Am. J. Med. 9: 343-355, Sept. 1950.

(4) Collins, V. P.: Bone involvement in cryptococcosis (torulosis). Am. J. Roentgenol. 63: 102-112, Jan. 1950.

(5) Mosberg, W. H., Jr., and Arnold, J. G., Jr.: Torulosis of central nervous system; review of literature and report of 5 cases. Ann. Int. Med. 32: 1153-1183, June 1950.

(6) Parrillo, O. J.: Disseminated mycotic disease; report of 3 cases. J. A. M. A. 144: 747-748, Oct. 28, 1950.

(7) Cook, A. W.: Cryptococcus (Torula) meningitis; report of 2 cases. J. A. M. A. 146: 1105-1107, July 21, 1951.

(8) Prezyna, A. P.: Cryptococcus neoformans meningo-encephalitis; report of fatal case. U. S. Armed Forces M. J. 1: 866-873, Aug. 1950.

(9) Howe, G. W.: Atypical case of meningo-encephalitis due to Cryptococcus neoformans (Torula histolytica); review of literature. South M. J. 43: 649-651, July 1950.

(10) Fisher, A. M.: Clinical picture associated with infections due to Cryptococcus neoformans (Torula histolytica); report of 3 cases with some experimental studies. Bull. Johns Hopkins Hosp. 86: 383-414, June 1950.

(11) Robertson, H. C., Jr., and Moseley, V.: Cryptococcus meningitis: report of case with survival after 14 months. Ann. Int. Med. 36: 1538-1540, June 1952.

(12) Carton, C. A.: Treatment of central nervous system cryptococcosis: review and report of 4 cases treated with actidione. Ann. Int. Med. 37: 123-154, July 1952.

CASE REPORT

A 29-year-old man was admitted to the Tokyo General Hospital on 8 April 1952 with chills, fever, sore throat, and a bilateral temporal headache which had begun about 10 days previously. His home was in the Territory of Hawaii and during World War II he had served in the Army in the United States, the Philippines, and Korea but he had been employed in Japan for 18 months. In October 1950 he was treated at home with

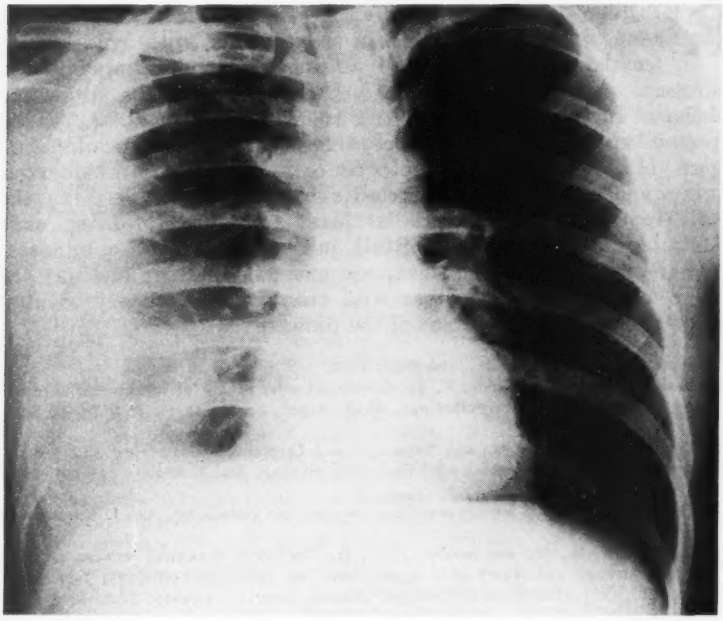

Figure 1.

penicillin for a febrile illness diagnosed "pneumonia." Recovery was uneventful. In May and June 1951, an idiopathic pleural effusion developed on the right side for which he was treated at a hospital in Tokyo with streptomycin and para-aminosalicylic acid (PAS) for 2 months. He returned to his job and was apparently free of symptoms until onset of his present illness.

On admission he had a temperature of 102.8° F. There was dullness to percussion and diminished breath sounds over the right lower half of his chest anteriorly and posteriorly. The examination was otherwise negative.

Initial therapy consisted of the usual supportive measures and injections of penicillin. Because the patient did not respond immediately, aureomycin by mouth was substituted for the penicillin. The patient continued to have a febrile peak daily but blood smears were repeatedly negative for malarial parasites. On 12 April he began to complain of more severe headache, pain in the neck, nausea, and vomiting. His neck was stiff and on 13 April a lumbar tap was performed. The spinal fluid contained 354 cells per cu. mm. (280 polymorphonucleocytes and 74 lymphocytes); 772 mg. of chloride per 100 cc.; 70 mg. of protein per 100 cc.; and 55 mg. of sugar per 100 cc. An EEG was con-

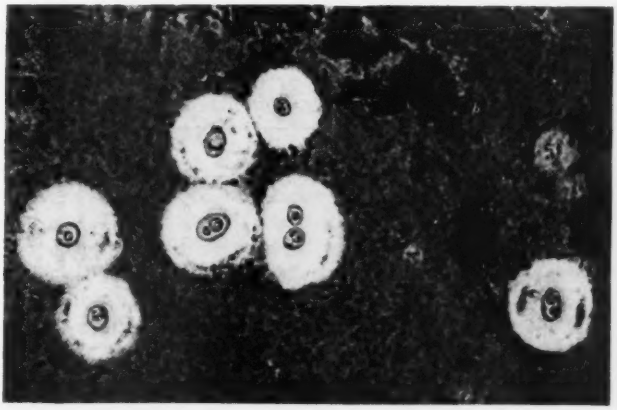

Figure 2. India-ink preparation of the spinal fluid showing typical C. neoformans.

sistent with a diagnosis of encephalitis. A roentgenogram of the chest revealed a homogeneous pleural density on the right side, most marked in the lower portion (fig. 1). Intramuscular injections of 1 gram of streptomycin twice daily and 12 grams of PAS daily by mouth were begun on 13 April because of the presumptive diagnosis of tuberculosis. The patient's temperature was usually normal in the morning with elevation to about 102° F. in the afternoon. His spinal fluid on 16 April was essentially unchanged except for reduction of the sugar to 16 mg. per 100 cc. Sulfadiazine, penicillin, and aureomycin were added to the therapeutic regimen because of suspected pyogenic meningitis. An india-ink preparation of the spinal fluid taken on admission showed forms suggestive of fungus or yeast. Another specimen taken on the same day was reported to contain acid-fast bacilli. Consequently a diagnosis of tuberculous meningitis was made, all antibiotics except streptomycin and PAS were discontinued, and the patient was evacuated to this hospital for further treatment, arriving on 25 April.

TABLE 1. *Spinal fluid findings*

Date	Cells (per cu. mm.)		Total protein	Sugar	Chloride as NaCl	Globulin	Smear	Pressure (mm. H_2O)	Remarks
	Poly*	Lymph**	(mg. per 100 cc.)	(mg. per 100 cc.)	(mg. per 100 cc.)	(Pandy)			
13 April	280	74	70	55.0	772	++++			
16 April	586	75	78	16.0	719	++++			
18 April	1,010	70	64	16.0	710	++++	? Yeast or fungus; acid-fast bacilli reported		Spinal fluid Wassermann negative
25 April	14	276	123	10.3	660	++++		Over 600	Transferred to Tripler Army Hospital 50 mg. of streptomycin instilled
27 April	1,581	119	93	3.0	625	++++	Numerous Cryptococci neoformans (india ink)	Over 600	50 mg. of streptomycin instilled
29 April			93	3.8	603	++++	Cryptococcus neoformans	Over 600	
30 April	1,580	120	82	7.5	627	++++	Cryptococcus neoformans	Over 600	
5 May	558	42	188	0	613	++++	Cryptococcus neoformans	Over 600	Fluid thick, viscid and slightly xanthochromic

*Polymorphonucleocytes.
**Lymphocytes.

On admission he appeared to be acutely ill. His sensorium was clouded but he was able to talk. His temperature was 100.4° F.; his pulse was 80; and his blood pressure was 130/90. Positive Kernig and Brudzinski signs were elicited. His pupils were equal and responded to light and accommodation. Funduscopic examination revealed bilateral papilledema. The chest examination was as noted earlier. There was paravertebral muscle spasm. A bilateral fourth nerve paralysis and a right seventh nerve paresis were observed. Sensory and other motor functions appeared to be intact. The knee jerks were equally hyperactive and there was a questionably positive Babinski sign bilaterally. The remainder of the physical examination was negative. The sedimentation rate was 22 mm. per hour (Wintrobe). Cutaneous tests with histoplasmin and coccidioidin were negative, but a tuberculin test was positive. The spinal fluid pressure on admission was over 600 mm. of water. The results of the laboratory examinations of the spinal fluid are shown in table 1.

The intramuscular injections of streptomycin, PAS by mouth, and daily intrathecal instillations of 50 mg. of streptomycin were discontinued on 28 April when an india-ink preparation of the spinal fluid revealed numerous encapsulated and budding fungi identified as *C. neoformans* (fig. 2). Subsequent india-ink preparations of cerebrospinal fluid consistently revealed abundant organisms which were readily grown in pure culture on Sabouraud's medium. Three grams of sulfadiazine were given at once followed by 1 gram every 4 hours with equal amounts of sodium bicarbonate. This dosage of sulfadiazine and 600,000 units of procaine penicillin intramuscularly every 4 hours was continued until the patient's death. On 2 May 1 gram of terramycin was given by mouth every 4 hours and this dosage was also continued until the patient died. Spinal punctures were performed every other day to relieve the spinal fluid pressure which consistently ranged over 600 mm. of water, but despite all therapy, the patient's course continued to be septic. *C. neoformans* were recovered from his sputum on several occasions but all acid-fast smears of spinal fluid and sputum at this hospital were negative for *Mycobacterium tuberculosis*. By 3 May the patient was disoriented. A brief lucid interval usually occurred after lumbar punctures. By 11 May he became comatose, but adequate intake of food and liquids was accomplished by tube feeding. His coma deepened, his respirations became shallower, he became incontinent of urine, and he died on 16 May.

Autopsy findings. There were dense adhesions between the right lobe of the liver, the diaphragm, and the peritoneum. A loculus containing gray, thick, purulent material was present between the greater omentum and the superior and inferior aspects of the right lobe of the liver. The right pleural cavity was

completely obliterated by thick, firm, fibrous adhesions. The pericardial cavity contained a small amount of clear, amber fluid.

The right lung weighed 410 grams and the left lung, 350 grams. The parenchyma of the left lung was grossly normal except for numerous miliary, gray, subpleural nodules over the anterior aspect of the inferior portion of the upper lobe. The right lung was encased in a thick fibrous shell. The parenchyma throughout showed a decrease in crepitus. At the anteroinferior margin of the right lower lobe, there was a smooth, gray, sharply circumscribed area of induration, measuring 2 by 1.5 by 1.5 cm. A section of this area revealed it to be partially encapsulated by a zone of dense fibrous tissue. Within this area the alveolar structures had been completely destroyed and replaced by inflammatory tissue. The bronchi were well preserved. Within part of the nodule, there was a dense infiltration of varying sized, lipoid-laden macrophages. Within this area only an occasional small collection of fungal organisms could be identified. Throughout the remainder of the nodule, there was a loose network of fibroblastic cells with a diffuse heavy distribution of fungal organisms. Sections of the remaining portions of the lungs showed varying degrees of inflammatory change. For the most part, the bronchi were filled with purulent exudate, and in many instances the exudate formed small, poorly circumscribed abscess cavities. The pleura at the site of the area of induration showed nonspecific fibrous thickening. At other sites the pleura showed extensive necrosis which was demarcated from pliable fibrous tissue by a zone of lymphocytic infiltration. No organisms were found in the pleural sections.

At some hepatic sites there was nonspecific fibrous thickening of the capsule. The abscess described grossly had a thick, fibrous, tissue wall. The lumen contained amorphous eosinophilic material. At the junction between the contents and the fibrous capsule, there was a zone of chronic inflammation manifested by a dense infiltrate of lymphocytes, scattered throughout which there were lipoid-laden macrophages and an occasional foreign-body type of giant cell. No organisms were identified.

Within the medulla of one of the sections of adrenal gland, there was an irregular zone of caseous necrosis surrounded by a thin rim of lymphocytes. No organisms were identified.

Exudate was present in the subarachnoid space of the brain, being particularly prominent over the dorsal aspect of the cerebellar hemispheres. Over the cerebral hemispheres the exudate tended to follow the course of the blood vessels. Within the white matter and basal ganglia of the cerebrum, there were multiple small cystic structures up to 0.4 cm. in diameter. Micro-

scopic sections showed that in all sections of the superficial aspect of the brain and spinal cord, the subarachnoid space contained innumerable yeast bodies. There was extensive fibroblastic proliferation and a diffuse infiltrate of inflammatory cells consisting predominantly of polymorphonucleocytes. An occasional foreign-body type of giant cell was identified. A section of choroid plexus showed extensive chronic inflammation within which many organisms were identified. Most of the cystic structures described grossly were sharply punched out and had no demonstrable lining. There was no inflammatory reaction in the adjacent brain and no identifiable material within the lumens. In no instance could organisms be found within a cyst.

DISCUSSION

The history of an inadequately treated idiopathic pleurisy preceding the present illness by 11 months, the pulmonary and meningeal symptoms, the reported finding of acid-fast bacilli in the spinal fluid, and other spinal fluid findings made the diagnosis of tuberculous meningitis seem most probable. Only the fortunate circumstance of making india-ink preparations of the spinal fluid led to establishing the correct diagnosis prior to the patient's death. The pathologist was unable to find any evidence of active tuberculosis post mortem.

A careful review of the various manifestations of cryptococcosis of the central nervous system was made by Mosberg and Arnold *(5)*. They mentioned only one patient with early pleural involvement and only one other patient in whom pleural reaction occurred as a terminal event. It is believed that the patient here reported is the first to have a clinical onset with an exudative and fibrotic pleural reaction.

Of the 189 patients with cryptococcosis of the central nervous system reported, 14 were still alive at the time of their respective reports. Carton *(12)* analyzed these 14 case reports and concluded that only 1 patient (reported by Marshall and Teed *(13)*) could be considered cured because follow-up data of the others was either inadequate, the patient had subsequently died, or the patient continued to manifest persistent pleocytosis or positive cultures in the cerebrospinal fluid. The patient considered cured was treated with sulfadiazine.

A wide variety of therapeutic agents, including iodides, vaccines, nonspecific fever, various heavy metals, and antibiotics, have been tried by various observers. Most recently Carton has reported 4 patients treated with actidione with encouraging re-

(13) Marshall, M., and Teed, R. W.: Torula histolytica meningoencephalitis; recovery following bilateral mastoidectomy and sulfonamide therapy; preliminary report. J. A. M. A. 120: 527-529, Oct. 17, 1942.

sults. Penicillin was given to our patients because of its reported action against *C. neoformans* in vitro, although the clinical experience of others was discouraging. It was decided to try terramycin because some indication of fungicidal action of terramycin was established by Pulaski *(14)* who noted a good response in 2 patients with cervical actinomycosis.

SUMMARY

The clinical course and laboratory findings in a patient with cryptococcosis strongly suggested tuberculosis. The correct diagnosis was established 18 days ante mortem by demonstrating *C. neoformans* in the spinal fluid. It is believed that this is the first reported patient in whom the onset of the disease was manifest only by exudative and fibrotic pleural reactions occurring 11 months prior to appearance of meningeal involvement. Intensive therapy with terramycin in addition to other conventional therapy did not appear to influence the progressive downhill course of the disease. The principal autopsy findings consisted of a diffuse leptomeningitis of the brain and spinal cord, pulmonary parenchymal and pleural inflammatory lesions, fibrous adhesions of the liver, an extrahepatic abscess, and a focus of necrotizing chronic inflammation in the adrenal medulla. Organisms present in the lungs and subarachnoid space were considered to be *C. neoformans*. Organisms were not identified within the pleural cavity, liver, or adrenals but because of the histologic characteristics of the lesions they were considered to be of cryptococcal origin.

(14) Pulaski, E. J.: Place of antibiotics in field of surgery. Ann. New York Acad. Sc. 53: 347-361, Sept. 15, 1950.

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The Principles of Neurological Surgery, by *Loyal Davis,* M. S., M. D., Ph. D., D. Sc. (Hon.), Professor of Surgery and Chairman of the Division of Surgery, Northwestern University Medical School, Chicago, Ill. 4th edition, thoroughly revised. 544 pages; 186 engravings, containing 354 illustrations and 5 plates, 4 in color. Lea & Febiger, Philadelphia, Pa., publishers, 1953.

AMEBIC GRANULOMA OF THE RECTUM SIMULATING CARCINOMA

KENNETH F. ERNST, *Colonel, MC, USA (1)*

ONE of the complications resulting from infection of the intestinal tract by *Endamoeba histolytica* is the development of a chronic hyperplastic process with or without abscess formation, now known as amebic granuloma or ameboma. Molinier et al. *(2)* reported 50 patients with proved amebiasis of whom 8 had amebomas. That this process may cause radiologic deformities, anemia, loss of weight, and intestinal hemorrhage simulating a neoplastic process is known, but erroneous clinical diagnoses of neoplasm resulting in disastrous operations still occur. This may be due to the failure sufficiently to emphasize this disease in the differential diagnosis of intestinal diseases.

Although Banks *(3)* stated that granulomatous lesions of amebiasis are commonly seen in the rectum and Donoso Infante and Amenabar Castro *(4)* listed the rectum, cecum, and sigmoid in order of frequency, most case reports concerning this pathologic feature have dealt primarily with lesions of the cecum and secondarily with other areas of the large bowel exclusive of the rectum. Exceptions were reported by Nevin *(5)*, Yeomans *(6)*, and Donoso Infante and Amenabar Castro.

The likelihood of confusing these lesions with carcinoma or the possibility of an intestinal obstruction resulting from them

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(1) Letterman Army Hospital, San Francisco, Calif. at time of writing; now at Walter Reed Army Hospital, Washington, D. C.

(2) Molinier, A.; Bensaude, A.; and Tabusse: Les lesions rectales de la dysenterie amibienne. Arch. d. mal. de l'app. digestif 38: 331-337, May-June 1949.

(3) Banks, R. W.: Amebiasis and amebic dysentery. In Bockus, H. L., et al.: Gastro-Enterology; Volume II, The Small and Large Intestine and Peritoneum. W. B. Saunders Co., Philadelphia, Pa., 1944. p. 629.

(4) Donoso Infante, A., and Amenabar Castro, E.: Pseudo canceres rectales de origen amebiano (granuloma amebiano). Rev. méd. Chile 80: 236-240, Apr. 1952.

(5) Nevin, R. W.: Amoebic granuloma. Proc. Roy. Soc. Med. 42: 769-774, Oct. 1949.

(6) Yeomans, F. C.: Amebic granuloma simulating carcinoma of colon and rectum. Am. J. Surg. 31: 365, Feb. 1936.

has been emphasized by Marsden *(7)*, Reddy and Rangam *(8)*, Yeomans, and Rudolph and Braudo *(9)*. Donoso Infante and Amenabar Castro also stressed the possibility of a carcinoma being mistaken for an ameboma and the possibility of the coexistence of both lesions. Why some patients should develop granulomatous hyperplastic lesions is unknown but they suggested the possibility that different strains of *E. histolytica* or acquired immunity in a population might influence the type of lesion which develops.

Because amebic granuloma should be considered in the differential diagnosis of obstructive or deforming lesions of the large bowel and because if neglected there is the possibility of serious diagnostic error, a case of amebic granuloma of the rectum is reported.

CASE REPORT

A 30-year-old Negro was admitted to Letterman Army Hospital by transfer from another hospital on 1 July with abdominal pain as his chief complaint. He had lived in California all his life. Abdominal pain and distention, especially after eating greasy foods, had been present since mid-May. The pain lasted for several hours at a time and was occasionally relieved by catharsis or the use of sodium bicarbonate. An exacerbation of this pain, predominantly in the upper part of the abdomen, recurred several weeks later after a large evening meal. The patient was hospitalized on 21 June and a diagnosis of tumor of the rectum was made. During this initial period of hospitalization, his temperature varied between 99° and 101° F.; his leukocyte count, from 8,400 to 14,000 with from 70 to 86 percent neutrophils. On 2 occasions the eosinophil count was 7 percent. During this hospitalization a Frei test was negative. A stool examination for parasites and ova was ordered but apparently was not done, as the results were not reported.

On transfer to this hospital he had lost 42 pounds and had vague abdominal tenderness, but no mass was palpable through the abdominal wall. Rectal examination disclosed a firm mass posteriorly, on the right, about the size of a lemon which seemed to involve the wall of the rectum. On admission his temperature was normal; his erythrocyte count was 4.7 million; his leukocyte count was 11,300, with 68 percent neutrophils and 6 percent eosinophils; and his hemoglobin was 15.5. During this hospitalization, his temperature varied up to a maximum of 100° F.;

(7) Marsden, C. M.: Amoeboma or carcinoma of rectum? J. Roy. Army M. Corps 88: 39-41, Jan. 1947.

(8) Reddy, D. G., and Rangam, C. M.: Amoebic granuloma (amoeboma) of large intestine. Indian M. Gaz. 81: 463-466, Nov. 1946.

(9) Rudolph A. M., and Braudo, J. L.: Amoeboma of large bowel, with review of literature. Clin. Proc. 6: 287-291, Sept. 1947.

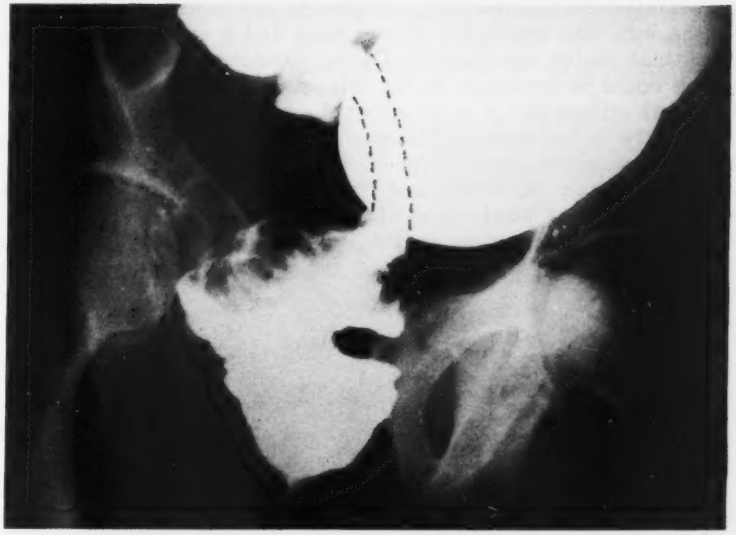

Figure 1. Barium enema showing filling defect of rectum.

his leukocyte count ranged up to 20,900 with 83 percent neutrophils; and his hemoglobin dropped to 7 after the onset of the intestinal hemorrhage which characterized the terminal stages of his illness. A barium enema revealed a constant filling defect encircling the upper half of the rectum (figs. 1 and 2). The greatest

Figure 2. Filling defect and irregularity in wall of rectum after partial evacuation.

defect appeared on the right, displacing the rectal lumen slightly to the left. The remainder of the colon and a subsequent gastrointestinal series was normal. During proctoscopy an obstruction which could be bypassed on the left was encountered 5 cm. above the anal orifice and a mass about 6 cm. in diameter, which was apparently in the rectal wall, was described. The mucosa of the rectum was normal except for mild congestion over the mass. No ulceration was observed and following proctoscopy purulent material drained freely from the rectum. The size of the mass decreased subsequent to drainage but induration of the tissues remained. Smear and culture of the purulent material yielded

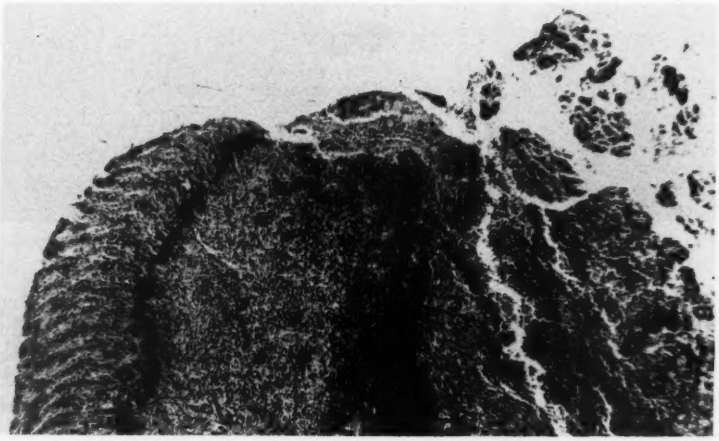

Figure 3. Margin of ulcer (H & E stain, X 37).

Escherichia coli, *Micrococcus pyogenes* var. *albus*, and nonhemolytic streptococcus. Examination of this material for parasites and ova was not requested and was not done. No specimen for biopsy was taken during this procedure. On the same day cystoscopic examination showed a bulging in the region of the trigone of the urinary bladder about 1.5 cm. in diameter, but the overlying mucosa was uninvolved.

On 23 July an exploratory laparotomy was performed. The organs in the pelvis were an adherent mass. This mass extended from the posterior surface of the urinary bladder to the sacral promontory, and the lower sigmoid went directly into it. Biopsy was impossible. No lymph glands were palpable along the aorta and there were no peritoneal tumor implants. A sigmoid colostomy was performed and division of the colostomy loop was completed on 4 August.

During the first postoperative week the patient began to pass small amounts of blood through the colostomy and by rectum, and in the latter part of August had several massive hemorrhages

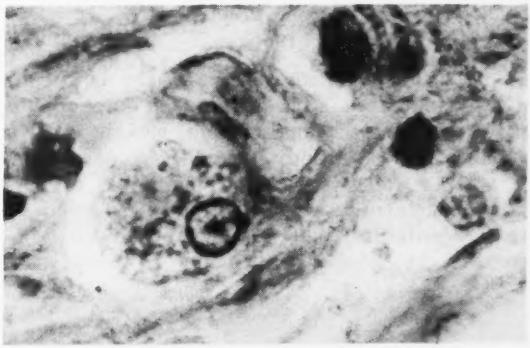

Figure 4. Trophozoite of E. histolytica *(H & E stain, X 1,800).*

from the rectum. His erythrocyte count dropped to 2.11 million with 7 grams of hemoglobin and he died during a massive hemorrhage on 4 September.

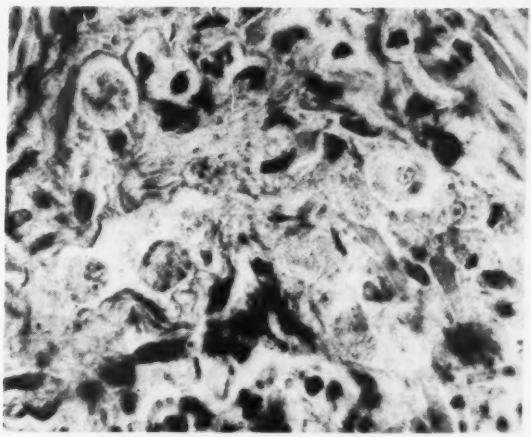

Figure 5. Colonization of E. histolytica *in wall of rectum (H & E stain, X 475).*

At autopsy the body weighed 80 pounds. Pressure on the abdomen caused dark-red fluid to exude from the colostomy opening. The pelvic peritoneal cavity was the site of an old organizing

peritonitis and the omentum was adherent to the abdominal wall about the colostomy. The rectum was adherent to the bladder and the descending colon to the dome of the bladder over an area about 5 cm. in diameter, and formed the roof of a localized abscess which filled the pouch of Douglas, extended into the pelvic retroperitoneal tissue, and communicated with the lumen of the descending colon through the upper portion of a mucosal ulcer. This ulcer was on the anterior surface of the bowel and proximal to the bulging, indurated area noted at proctoscopy (fig. 3). It began about 6 cm. from the anal orifice, measured 7 cm. in diameter, and undermined the rectosigmoidal mucosa. Scrapings from the margin of this ulcer revealed trophozoites of *E. histolytica* and microscopic examination of the bowel showed colonization by the same organisms (figs. 4 and 5). The wall of the bowel was fibrosed and thickened (fig. 6).

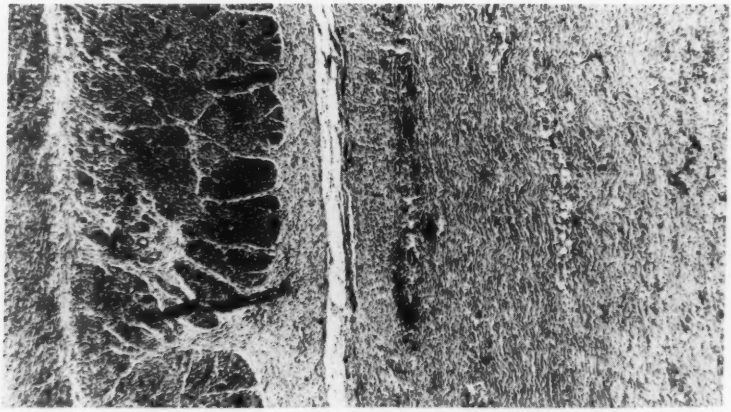

Figure 6. Fibrous thickening of rectal wall (H & E stain, X 37).

COMMENT

Deep involvement of the bowel wall by *E. histolytica* occurs, presumably, by lytic action on the mucosa. After penetrating this structure, the organisms commonly advance laterally, destroying the submucosa as they advance and produce a "water-bottle" ulcer with narrow opening and a broad submucosal cavity. This feature in another case from the files of the Armed Forces Institute of Pathology is illustrated in figure 7. No lesion is produced unless active colonization of the *E. histolytica* occurs *(10)*. These features in part, were present in this case of amebic granuloma of the rectum which came to autopsy with a clinical diagnosis of carcinoma. This case emphasizes the importance of

(10) Ash, J. E., and Spitz, S.: Pathology of Tropical Diseases. W. B. Saunders Co., Philadelphia, Pa., 1945. p. 80.

considering the possibility of an inflammatory process in the diagnosis of obstructive, deforming lesions of the bowel. It is doubtful that an inflammatory disease was seriously considered in this case because no examination of feces for parasites and ova was recorded. Even had the purulent material, which drained after proctoscopy, been examined for amebas, it is doubtful that they could have been identified in the necrotic debris. Failure to demonstrate the causative organism by examination of feces or material from abscesses and fistulas is not infrequent and Rudolph and Braudo stressed the diagnostic value of a therapeutic response to emetine in obscure cases. Gunn and Howard *(11)* emphasized the necessity for examination of material from the base and edges of ulcers where organisms are most numerous.

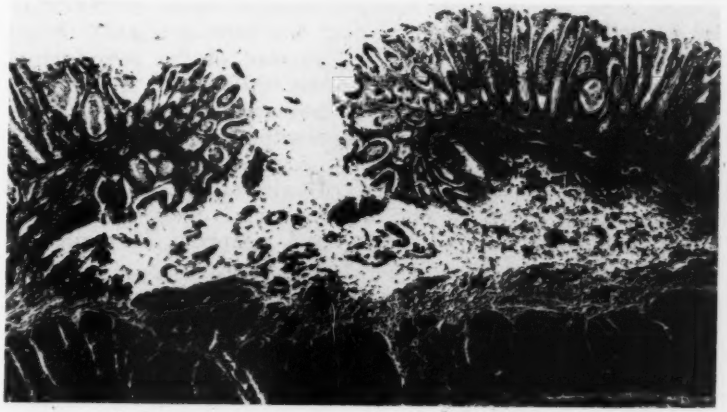

Figure 7. Typical "water-bottle" ulcer.

The past history, the complaints, and some of the clinical findings or lack of them in this case contained little to suggest an amebic infection. According to Nevin most patients with intestinal amebiasis do not have an associated dysentery so this symptom should not be used as a prime criterion in the diagnosis.

In retrospect, the elevated leukocyte count with a high percent of neutrophils and the febrile reaction perhaps should have suggested an inflammatory process. The significance of the slightly elevated eosinophil count is not known. It is possible that the ulcer of the rectum noted at autopsy was present at the time of proctoscopy but that it was not seen because of its location above and behind the elevated and indurated mass infringing on the lumen of the bowel.

(11) Gunn, H., and Howard, N. J.: Amebic granulomas of large bowel; their clinical resemblance to carcinoma. J. A. M. A. 97: 166-170, July 18, 1931.

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BOOK REVIEW

Clinical Periodontology, The Periodontium in Health and Disease, Recognition, Diagnosis and Treatment of Periodontal Disease in the Practice of General Dentistry, by *Irving Glickman*, B. S., D. M. D., F. A. C. D., Professor of Oral Pathology and Periodontology and Director of the Division of Graduate and Postgraduate Studies, Tufts College Dental School; Associate Staff (Stomatology), New England Center Hospital; Consultant in Periodontology, Forsyth Dental Infirmary for Children; Lecturer in Oral Pathology, Boston University School of Medicine, Boston, Mass. 1,019 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., publishers, 1953.

This book is one of the most informative texts of the known aspects of periodontal disease that has been published to date. It is divided into 3 sections: (1) tissues of the periodontium, devoted to a discussion of the tissues which make up the "periodontium," namely the periodontal membrane, the gingiva, mentum, and the alveolar bone; (2) periodontal disease, in which the various diseases to which the periodontium is subjected together with their etiology and classification are discussed; and (3) clinical management of periodontal disease, which includes the diagnosis, prognosis, and treatment of periodontal disease.

This division will prove helpful to readers who are using the text as reference for a particular subject in the field of periodontology or oral pathology. The author does not favor any one particular operative technic for the eradication of the periodontal, but thoroughly discusses all of the accepted technics that are used today.

The text is well illustrated with black and white photographs and diagrams. This book should prove to be of great value to both the practitioner and student in the field of periodontology, and especially so to those who are concerned with the histopathologic changes that constitute periodontal disease.

—Capt. T. D. Pryse, USAFR (DC)

METAPHYSIAL ACLASIS[1]

THOMAS B. DAMERON, Jr., *Lieutenant, MC, USNR*

WILLIAM H. GULLEDGE, *Commander, MC, USN*

METAPHYSIAL aclasis is a hereditary abnormality of osseous development. It is often confused with other bone diseases because of the diversity of anomalies. It is characterized by osteocartilaginous exostoses varying in number from one to several hundred and by characteristic skeletal deformities (2). It is classified under a variety of names among which are hereditary deforming dyschondroplasia (3), multiple congenital exostoses, chondrodysplasia, hereditary multiple exostoses (4, 5), multiple cartilaginous exostoses, diaphysial aclasis, and metaphysial aclasis. We believe that the term metaphysial aclasis most accurately describes the location and the nature of the condition.

The characteristic deformities have been observed on the skeletons of dinosaurs and men from the Stone Age. It was first described in 1864 by Virchow as exostosis multiple cartilaginea (6). The hereditary developmental deforming tendency is transmitted as a Mendelian recessive characteristic affecting males predominantly. The most acceptable theory as to pathogenesis is that the deformities result from a disarrangement of the epiphysial cartilaginous plates and a deficiency of the ring of metaphysial periosteum (7). The former causes bone to grow out at an angle from the normal contour of the bone, forming exostoses. The latter causes a failure of the modeling process of the metaphysis resulting in the entire unmodeled metaphysis being the same width as the diameter of the epiphyseal line.

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(1) U. S. Naval Hospital, Bainbridge, Md.

(2) Stocks, P.: Hereditary Disorders of Bone Development. Part I. Diaphysial Aclasis (Multiple Exostoses), Multiple Enchondromata, Cleido-Cranial Dysostosis. With the assistance of Amy Barrington. The Treasury of Human Inheritance, edited by Karl Pearson. Vol. 3. Francis Galton Laboratory for National Eugenics. Eugenics Laboratory Memoirs, 22. Cambridge University Press, New York, N. Y., 1925.

(3) Ehrenfried, A.: Hereditary deforming chondrodysplasia—multiple cartilaginous exostoses; review of American literature and report of 12 cases. J. A. M. A. 68: 502-508, Feb. 1917.

(4) Jaffe, H. L.: Hereditary multiple exostosis. Arch. Path. 36: 335-357, Oct. 1943.

(5) Stark, J. D.; Adler, N. N.; and Robinson, W. H.: Hereditary multiple exostoses. Radiology 59: 212-215, Aug. 1952.

(6) Virchow, R.: Die Krankhaften Geschwulste. Verlag Von August Hirschwald, Berlin, Germany, 1864-1865. p. 83.

(7) Fairbank, H. A. T.: Diaphysial aclasis; synonyms; multiple exostoses, hereditary deforming chondrodysplasia. J. Bone & Joint Surg. 31-B: 105-113, Feb. 1949.

Because the deformities result from abnormal development, the exostoses stop progressing in size when the bones stop growing. Any growth of a lesion after normal bone growth has stopped must be suspected as a malignancy. As would be expected, the lesions are most frequent where bone-growth is normally greatest. Bone formed in membrane is not affected *(8)*. The epiphyses are never involved.

Roentgenographic appearance. Individual exostoses have broad bases fused with the parent bone without a line of demarcation. The apex of the lesion points toward the center of the diaphysis. There is a broadening of the metaphysis and adjacent diaphysis in the region of the exostosis. In addition to the multiple exostoses and metaphysial deformities, there is frequently a shortening of the ulna and sometimes a bowing of the radius (fig. 1). Dislocation of the radial head occurs less often. In about 20 percent of the patients there is a shortening of the fibulas and genu valgum. Those affected are usually shorter in stature than their unaffected siblings. Seventy-five percent of the lesions are relatively symmetrical. The exostosis cannot be differentiated from the underlying bone microscopically. The size of the overlying cartilaginous caps diminishes as the exosto-

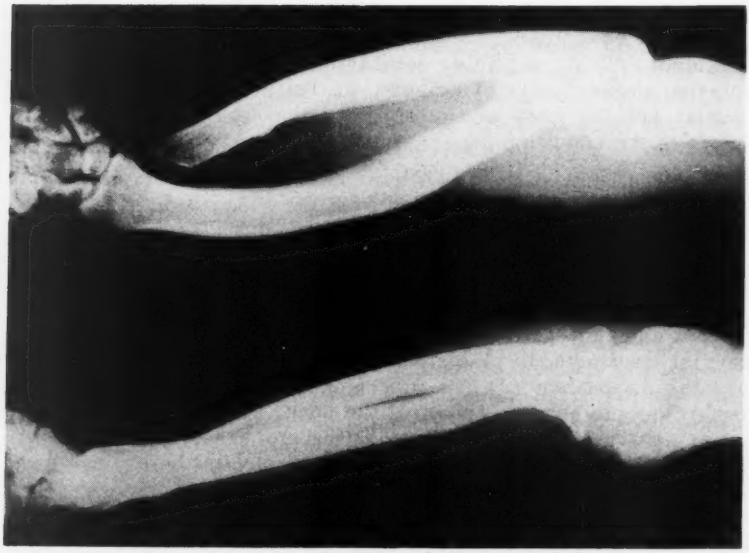

Figure 1. Bowing of radius and shortening of ulna.

(8) Keith, A.: Studies of anatomical changes which accompany certain growth-disorders of human body. Am. J. Anat. 54: 101-115, Jan. 1920.

sis matures (9). There is no evidence of the lesions being neoplastic except in the rare incidences of malignant degenerations.

The condition is most frequently confused with dyschondroplasia. Because there is no cross inheritance of the 2 developmental abnormalities, we can be sure that they are different.

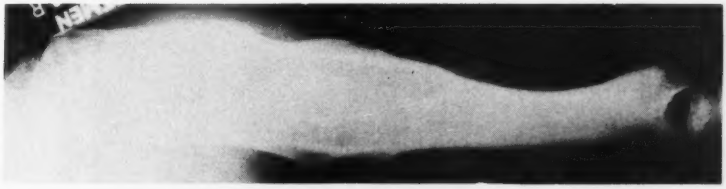

Figure 2. Typical appearance of humerus.

Metaphysial aclasis results in outgrowths from the surface of the parent bone, whereas, chondrodysplasia results in masses of the cartilage being displaced inside the affected bone. There is little alteration of the outer contour in dyschondroplasia and there is a predilection for the phalanges and sternum. Metaphysial aclasis

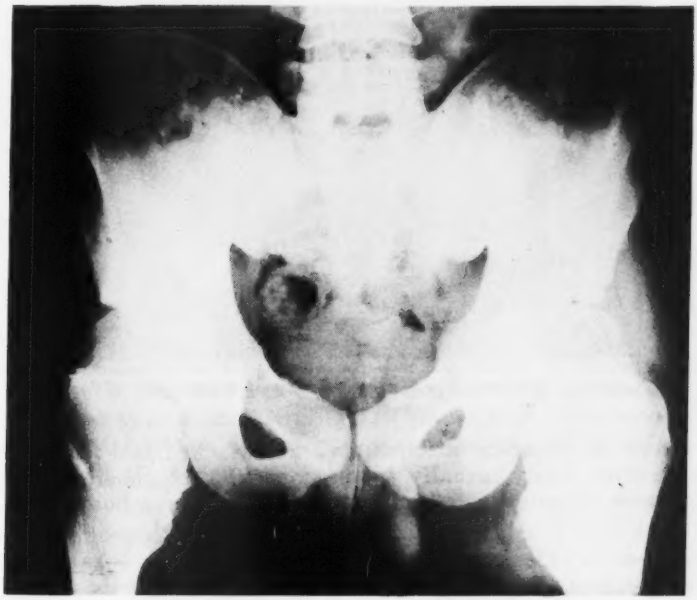

Figure 3. Broadening of femoral neck and trochanteric areas. Exostoses can also be seen on ilium, ischium, and pubis.

(9) Geschickter, C. F., and Copeland, M. M.: Tumors of Bone. 3d edition. J. B. Lippincott Co., Philadelphia, Pa., 1949. pp. 79-87.

shows a predilection for the ends of the long bones where growth is greatest (figs. 2-5).

Complications. The most common sequelas are the interference with joint motion by the exostoses, painful bursas, and

Figure 4. Failure of modeling process of metaphysis of lower end of femur.

pressure on adjacent arteries and nerves. Malignant degeneration occurs rarely, usually in the form of chondrosarcoma *(10)*, but cases of osteogenic sarcomatous change have been reported *(11, 12)*.

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(10) Ellis, V. H., and Taylor, J. G.: Diaphysial aclasis; report of unusual case. J. Bone & Joint Surg. 33-B: 100-105, Feb. 1951.

(11) Bennett, G. E., and Berkheimer, G. A.: Malignant degeneration in case of multiple benign exostoses with brief review of literature. Surgery 10: 781-792, Nov. 1941.

(12) Gardner, E. K.: Two cases of diaphysial aclasis showing sarcomatous change. Brit. J. Surg. 25: 323-329, Oct. 1937.

CASE REPORTS

Case 1. A 17-year-old man was found at the age of 2 years to have "bunches" on his extremities. These increased in size until the patient was 15 years old. He had had no therapy and had no symptoms prior to entry into the service. Since being in the service, he had not been able to perform his duties because of

Figure 5. Deformity at ankle joint, showing widening of metaphyses, exostoses, and tilting of mortise.

pain in his shoulders and feet. There was no family history of skeletal abnormalities. Examination revealed relatively symmetrical hard masses up to 8 cm. in diameter over the ends of all the long bones, scapulas (fig. 6), and phalanges. There was a full range of joint motion except for the right elbow, which had a 20° limitation of extension.

Case 2. A 20-year-old man was found at the age of 10 years to have "lumps" on his bones. These increased in size until he was 15 years old. There had been no change in size of any of the lesions since that time. Three of the masses were removed when he was 16 years old and the pathologist reported no malignancy. The patient has been asymptomatic. He was referred to us for evaluation as to his suitability for the military service. There was no family history of skeletal abnormalities. Examination

revealed masses from 1 to 4 cm. in diameter over the ends of the long bones and scapulas. There was a full range of motion in all joints except for limitation of knee flexion to 80°.

Case 3. A 17-year-old man was found at the age of 5 years to have "knots" on his bones. These grew in size until he was 16 years old. There had been no growth of any of the masses since. The patient was unable to stand or walk for prolonged periods because of the pain in his feet and ankles. His only sibling, a brother, and a nephew were similarly affected. No other known skeletal abnormality was present in the family. Examination showed palpable bony masses varying from 0.3 to 3 cm. in di-

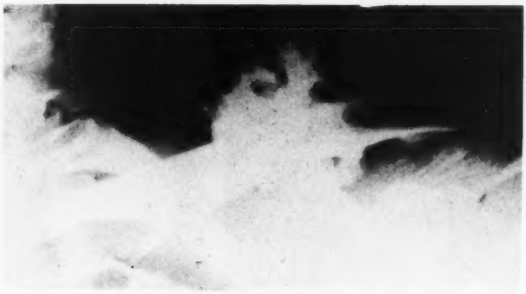


Figure 6. Bony mass arising from spine of scapula.

ameter over the second lumbar spinous process, ilium, clavicles, scapulas, ribs, and long bones.

Comment. All 3 of these recruits were separated from the service because of their symptoms and findings. Figures 1 to 6 show typical changes in the involved areas.

SUMMARY

Metaphysial aclasis is a hereditary developmental disorder of the bones. The lesions are *not* true bone tumors. The disease is characterized by multiple exostoses in the metaphysial regions and a general widening of the metaphysis. Malignant degeneration must be expected when any of the bony lesions continues to grow after the patient has stopped growing.

LARGE CALIBER MISSILE WOUND OF THE HEART[1]

ARTHUR R. NELSON, *Lieutenant, MC, USNR*

JOSEPH J. ZUSKA, *Commander, MC, USN*

FROM the first reported successful suture of a traumatic wound of the heart by Rehn in 1896 *(2)* to the recent years of rapidly advancing knowledge in the field of cardiovascular surgery, it has become apparent that wounds of the heart are no longer surgical rarities *(3-5)*. The case here reported is of special interest only in that the heart wound was produced by a large caliber missile at close range, was not exsanguinating despite large rents in the left ventricle, and emphasizes the necessity for clinical suspicion of heart damage even in the absence of the classic signs of tamponade.

CASE REPORT

A 28-year-old sailor was admitted to the hospital at 0430 on 8 January 1953, having accidentally shot himself with a .45 caliber service automatic about 30 minutes prior to admission. The force of the missile had thrown the patient from the deck of his ship into the waters of the dockyard where he was on duty. He was pulled aboard and rushed to the hospital. Examination revealed the patient to be in extreme respiratory distress with pallid cyanosis, grunting dyspnea, a blood pressure of 70/40, and a pulse of 130. There was a circular wound of entrance 2 cm. in diameter in the fourth interspace 5 cm. to the left of the midsternal line, from which bright blood was streaming. A smaller circular wound of exit in the left third interspace, 7 cm. from the vertebral spines, was whistling air during the inspiratory phase. Subcutaneous emphysema was present over the anterior surface of the left side of the chest and extended into the neck, which made estimate of the tracheal position indeterminate. A left thoracentesis in the anterior axillary line was performed immediately, and

(1) U. S. Naval Hospital, Key West, Fla.

(2) Rehn: Cited in Griswold, R. A., and Maguire, C. H.: Penetrating wounds of heart and pericardium. Surg., Gynec. & Obst. 74: 406-418, Feb. (No. 2A) 1942.

(3) Bigger, I. A.: Heart wounds; report of 17 patients operated upon in Medical College of Virginia hospitals and discussion of treatment and prognosis. J. Thoracic Surg. 8: 239-253, Feb. 1939.

(4) Blalock, A., and Ravitch, M. M.: Consideration of nonoperative treatment of cardiac tamponade resulting from wounds of heart. Surgery 14: 157-162, Aug. 1943.

(5) Elkin, D. C.: Vascular injuries of warfare. Ann. Surg. 120: 284-310, Sept. 1944.

air under high tension was found in the pleural cavity. The needle was fixed to the chest wall and attached to a makeshift underwater seal drainage. This resulted in rapid improvement in the respiratory distress. Dextran solution was given intravenously, followed shortly by type O blood with Witebsky substance. Further examination of the chest disclosed no apparent evidence of tamponade, but in view of the projected path of the missile and the evidences of shock and forceful bleeding from within the chest wound, preparation for thoracotomy was begun. Two pints of blood were given and the blood pressure at the onset of the operation was 120/100; the pulse was 120.

Under endotracheal ether and oxygen anesthesia, the left side of the chest was opened through an anterior fourth interspace in-

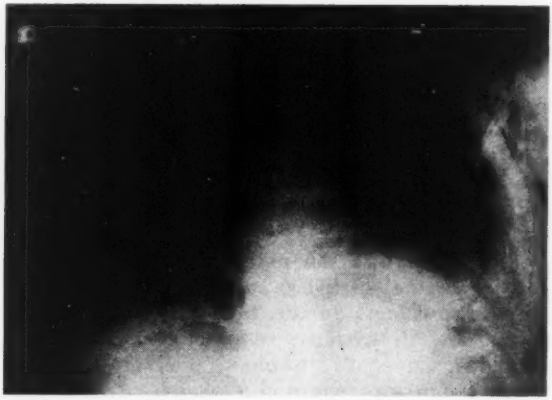
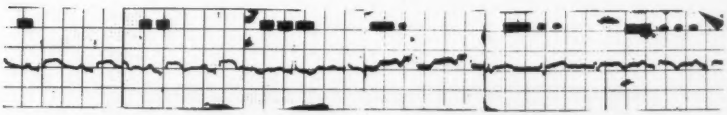


Figure 1. Roentgenogram of chest taken on second postoperative day.

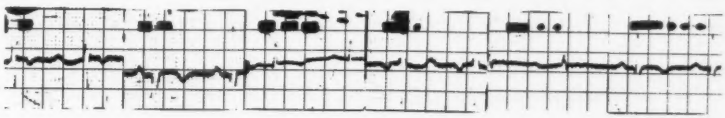
cision extending from the sternum to the anterior axillary line. The left pleural cavity was found to contain about 750 cc. of blood. The pericardium appeared blue and was incised longitudinally, exposing a 3- by 2-cm. wound in the anterolateral surface of the left ventricle about 1 cm. below the circumflex coronary vessels. The edges of the wound were bleeding moderately. About 200 cc. of blood lay in the pericardial cavity. A No. 0000 silk mattress suture was placed in an attempt to approximate the wound edges. This apparently disturbed a clot within the ventricular wound and resulted in the onset of massive hemorrhage from the ventricular cavity. A finger was placed across the wound to control the hemorrhage while several mattress sutures of No. 00 silk were placed and tied, effectively closing the wound. On further inspection of the heart, a circular wound of exit was noted in the posterior proximal portion of the left ventricle, but

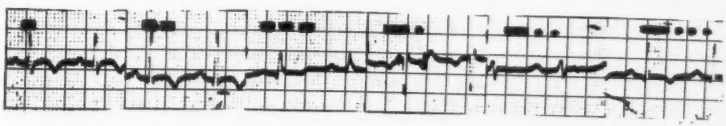
was small, firmly approximated, and not bleeding. This wound was not sutured. The pericardium was loosely closed with No. 0000 silk, gaps being left at both extremities of the closure for adequate drainage of the cavity.

The left lung contained a circular wound of entry 1.5 cm. in diameter in the anteromedial portion of the left upper lobe, and a similar wound of exit in the posterior midportion of that lobe. The



10 JAN 1953—SECOND POSTOPERATIVE DAY

14 JAN 1953—SIXTH POSTOPERATIVE DAY

23 JAN 1953—FIFTEENTH POSTOPERATIVE DAY



17 FEB 1953—FORTIETH POSTOPERATIVE DAY

Figure 2. Serial ECG's recorded postoperatively indicating progressive infarction pattern. Inverted T waves in leads I, II, and III with upright T waves in V_1 and V_2 and again inverted in III and VI in the stabilized pattern (fortieth day) indicated an old lateral infarction pattern.

area between was solidified with clotted blood. Both pulmonary rents were closed with single mattress sutures of No. 00 chromic catgut. A stab wound was made in the dependent portion of the left side of the chest, and a mushroom catheter inserted for underwater seal suction drainage of the pleural space. The wounds of

entrance and exit in the chest wall were excised, and the thoracic incision closed in layers with fine silk.

At the end of the operation, the patient's blood pressure was 120/70 and he appeared to be in good condition. Oxygen, antibiotics, chest drainage, a tetanus toxoid booster, and trivalent gas gangrene antitoxin were administered. For the first several postoperative hours the patient blew air via the drainage system, and the subcutaneous emphysema increased to involve the whole of the left side of the thorax, neck, and face, but this soon ceased, and the emphysema progressively resolved.

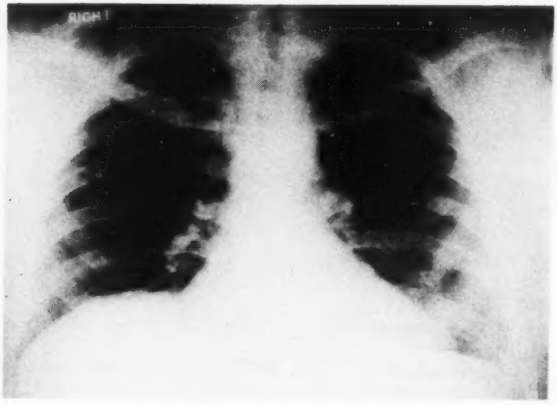


Figure 3. Roentgenogram of the chest taken on the fortieth postoperative day. There were moderate pleuropericardial adhesions on the left.

About 15 hours postoperatively the patient became suddenly dyspneic and slightly cyanotic. A roentgenogram of the chest disclosed atelectasis of the right upper lobe and an area of increased density in the left upper lobe which was interpreted as the area of infarction produced by the missile. Bronchoscopy was done at the bedside and about 60 cc. of thick bloody mucus was aspirated from the right main bronchus, resulting in immediate improvement (fig. 1). Further bronchoscopy was required twice a day for the following 2 days, each time with dramatic relief of respiratory distress. Roentgenograms of the chest showed progressive clearing of the atelectatic areas. Steady improvement of the patient and effective coughing had ameliorated the problem of bronchial secretions by the fourth day. During that time the patient's temperature had intermittently reached 102.6° F. From that time there was steady improvement until by the tenth day he was afebrile, free of cough, jocular, and eating well. The thoracic wound healed satisfactorily. Chest films showed progressive clearing of the area of infarction in the left upper lobe.

Serial ECG's taken from the first postoperative day showed an interesting pattern of slowly progressive lateral infarction. This had stabilized by the fourth week, but it is expected that electrocardiographic evidence of damage will persist indefinitely (fig. 2). The patient was returned to full duty after 10 weeks' convalescence (figs. 3 and 4).

DISCUSSION

The successful outcome of this case emphasizes several points: that even large wounds of the ventricular cavities are not necessarily exsanguinating; that tamponade will be self limiting

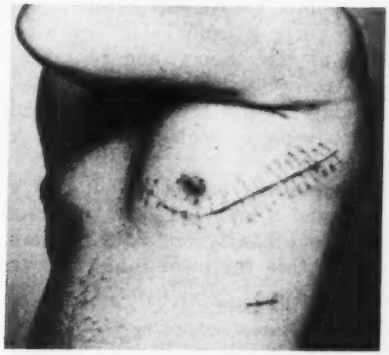


Figure 4. Photograph taken postoperatively showing healed anterior thoracotomy scar and site of pleural drainage.

when the pericardial rent is of adequate size to allow for drainage into the pleural space; that a high index of suspicion should be maintained when dealing with wounds of the chest, and exploration carried out when the type of wound and its location suggest possible severe cardiac damage, even though none of the signs of tamponade are apparent. It should be mentioned of course, that a very happy combination of circumstances which allow these patients to be rapidly transported to adequate hospital facilities is of paramount importance.

BOOK REVIEWS

The Grassi Block Substitution Test for Measuring Organic Brain Pathology, by *Joseph R. Grassi,* A. B., M. A., Director of Clinical Psychology, Assistant Professor of Clinical Psychology, Bowman Gray School of Medicine, Wake Forest College, Winston-Salem, N. C. American Lecture Series, Publication Number 149, A Monograph in American Lectures in Psychology, edited by *Molly Harrower,* Ph. D., Research and Consulting Psychologist, New York, N. Y. 75 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1953. Price $3.

This manual describes the development and application of a clinical aid for the early diagnosis of organic brain pathology. It is an extension of the theory and practice inherent in the better known Goldstein-Scheerer Cube Tests. Unfortunately, the details of standardization are not presented with sufficient care to permit rigorous psychometric scrutiny. Although alleging that interpretations become more valid with experience, the author himself distrusts the test score in the absence of other indexes of behavior and a knowledge of intellectual level. While the Grassi test may eventually be proved reliable and valid for the purpose intended, this reviewer feels that the present publication is premature.—*Maj. R. B. Payne, USAF (MSC)*

Diseases of the Digestive System, edited by *Sidney A. Portis,* B. S., M. D., F. A. C. P., Associate Clinical Professor of Medicine, University of Illinois Medical School; Senior Attending Physician in the Department of Medicine, Michael Reese Hospital; Consulting Physician, Cook County Hospital; Member of Advisory Board of Institute of Psychoanalysis; Chief of the Medical Services of the Institute for Psychosomatic and Psychiatric Research and Training, Michael Reese Hospital, Chicago, Ill., with 57 Contributors. 3d edition, thoroughly revised. 1119 pages; 269 engravings and 5 color plates. Lea & Febiger, Philadelphia, Pa., publishers, 1953. Price $20.

In this excellent and well-organized textbook, the anatomy, physiology, and diseases of the digestive system are comprehensively described and discussed. Special attention is given to psychosomatic disturbances related to the gastrointestinal tract and to the more recently developed knowledge and treatment of gastrointestinal diseases.

This volume is larger than previous editions because of added material and fuller coverage of subject matter. The chapters have been rearranged and 8 new chapters have been added, with much advantage to the reader for ready reference. This book is of value to the gastroenterologist, especially to the teacher in this specialty, the general practitioner, and the student desirous of making a complete study of diseases of the digestive system.

—*Col. P. I. McShane, MC, USA*

CARDIAC ARREST WITH RECOVERY

BENJAMIN H. INLOES, Jr., *Major, USAF (MC)* (1)

ADANTO A. S. D'AMORE, *Colonel, USAF (MC)* (1)

THE following case is reported to alert physicians to the ever-present danger of cardiac arrest during surgical procedures. This phenomenon may occur during the removal of an ingrown toenail under local anesthesia (2) in an outpatient clinic or while a thoracic operation is being performed under general intubation anesthesia. Only by the constant vigilance of the surgeon and the anesthetist can this condition be recognized and its mortality decreased. The acumen of the anesthesiologist in recognizing this condition and the readiness of the surgeon to perform an immediate thoracotomy are essential. Glenn (3) has stated, "The most important instrument is a knife."

CASE REPORT

A 38-year-old woman, gravida II, para II, had been seen in the gynecology clinic because of menorrhagia of 4 months' duration and stress incontinence for 3 months. The physical examination was essentially normal except for a relaxed vaginal outlet and a moderate thoracic scoliosis with the concavity to the left.

The patient was admitted on 14 January 1953 for repair of her vaginal outlet. She was taken to the operating room on the following day at about 1015 hours. The preanesthetic sedation consisted of 50 mg. of demerol and 0.4 mg. of atropine sulfate given at 0900 hours. At 1030 hours she was given 0.25 grams of thiopental sodium intravenously followed by nitrous oxide, ether, and oxygen. Her blood pressure was 120/70 and her pulse rate was 80. The operation was begun at 1045 hours with the patient in the lithotomy position. At 1059 hours her respirations ceased and her heart tones and blood pressure were not detectable. A diagnosis of cardiac arrest was made by the anesthetist. A thoracotomy in the fifth left interspace was performed at 1102 hours. The

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(1) U. S. Air Force Hospital, Langley Air Force Base, Va.

(2) Lahey, F. H., and Ruzicka, E. R.: Experiences with cardiac arrest. Surg., Gynec. & Obst. 90: 108-118, Jan. 1950.

(3) Glenn, F.: Panel discussion on cardiac arrest. Thirty-eighth Clinical Congress, American College of Surgeons, New York, N. Y., Sept. 26, 1952.

heart was not beating. The myocardial pulsations recurred after the first initial compressions. Meanwhile respirations were maintained by the use of the anesthesia machine. The patient had not been intubated. The peripheral pulse became palpable with the initiation of regular heart beats. No attempt was made to use sterile technic for the thoracotomy, but for the closure fresh drapes, gowns, and gloves were used. A rubber catheter was inserted into the pleural cavity before the closure was begun. When the closure was almost completed the anesthetist re-expanded the lung and the catheter was removed. The closure was then completed and a petrolatum-gauze dressing was applied. A small rubber drain was inserted subcutaneously.

The patient was returned to her room, given oxygen by a nasal catheter and 5 percent dextrose solution in water containing 1 ampule of methoxamine hydrochloride intravenously. The blood pressure stabilized between 90/60 and 100/70. Two hours after leaving the operating room the patient was reacting normally. Four hours later she recognized her husband and requested that he remain with her. A roentgenogram of the chest taken in her room revealed the left lung to be almost completely re-expanded. An ECG was normal.

The patient was followed postoperatively with additional roentgenograms and ECG's, which were all within normal limits. Her convalescence was complicated by a superficial breakdown of the thoracic wound and a slight pleural effusion, but additional surgical intervention was not required. The patient left the hospital on the fifteenth postoperative day.

DISCUSSION

The incidence of cardiac arrest is apparently increasing, but the complication is being recognized more readily by surgeons and trained anesthesiologists. The "unexplained death in the operating room" of many years ago is now being diagnosed. The great number of thoracic operations now being performed will further increase the incidence of cardiac arrest. Its cause is not clearly understood, but contributory factors are hypoxia, hypercapnia, and vagal stimulation. Physical factors which contribute to these conditions are senility and debility, a pre-existing anemia, cardiovascular disease, or an acute blood loss not quickly replaced. Excessive preoperative sedation or an overdose of anesthetic may produce hypoxia or hypercapnia. The role of reflex vagal stimulation is presumptive. Reports have appeared citing cases of cardiac arrhythmia or arrest coincident with endotracheal intubation or extubation (*4*, *5*). Many

(*4*) Burstein, C. L.; LoPinto, F. J.; and Newman, W.: Electrocardiographic studies during endotracheal intubation; effects during usual routine techniques. Anesthesiology 11: 224-237, Mar. 1950.

authors believe that the problem of vagal influences may only be produced in the presence of hypercapnia or hypoxia *(6)*.

The anesthetist is responsible for early detection of this condition unless the surgeon has the heart or the great vessels under direct vision. Permanent damage to the cerebrum or the psyche will result unless the circulation is restored within 3 to 4 minutes. Death usually occurs in arrests of 8 minutes or longer. Johnson and Kirby *(7)* stated that the surgeon must assume that arrest has occurred whenever the anesthetist reports that he is unable to detect a pulse or obtain a blood pressure reading. Additional diagnostic procedures as electrocardiography, ophthalmoscopy, or prolonged auscultation only waste time. Occasional errors in diagnosis may be encountered in patients with coronary occlusion or massive pulmonary embolus. This risk must be accepted because prompt therapy will save more patients with cardiac arrest than will be lost through misdiagnosis. Rupture of the heart during cardiac massage in the presence of myocardial infarction is usually a fatal complication *(8)*.

Treatment of this condition is directed toward restoration of the normal heart beat and maintenance of the pulmonary oxygen supply. This therapy is conducted initially by the anesthetist who forces 100 percent oxygen into the patient's lungs by artificial respiration through an endotracheal tube, or an adequate airway, using a tight-fitting face mask. The surgeon must manually pump the oxygenated blood from the heart to the brain. Cardiac massage is the most important therapeutic step. Performed through a thoracotomy incision, it is so far superior to transdiaphragmatic massage that the additional incision should be made *(9)*. Sterile preparation is not as important as an available knife.

The incision should be made in the fourth or fifth left interspace and the adjacent ribs may be separated from their cartilaginous insertion 3 cm. from the sternum if necessary. The heart is grasped with the entire hand and regular forceful compression is administered from 50 to 60 times a minute. The re-

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(5) Shumacker, H. B., Jr., and Hamptom, L. J.: Sudden death occurring immediately after operation in patients with cardiac disease, with particular reference to role of aspiration through endotracheal tube and extubation. J. Thoracic Surg. 21: 48-56, Jan. 1951.

(6) Sloan, H. E.: Vagus nerve in cardiac arrest; effect of hypercapnia, hypoxia and asphyxia on reflex inhibition of heart. Surg., Gynec. & Obst. 91: 257-264, Sept. 1950.

(7) Johnson, J., and Kirby, C. K.: Experimental study of cardiac massage. Surgery 26: 472-478, Sept. 1949.

(8) Hurwitt, E. S., and Seidenberg, B.: Rupture of heart during cardiac massage. Ann. Surg. 137: 115-119, Jan. 1953.

(9) Panel discussion on cardiac arrest. Thirty-eighth Clinical Congress, American College of Surgeons, New York, N. Y., Sept. 26, 1952.

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sumption of cardiac action is usually prompt if it is to occur. If the heart does not begin to beat within 1 or 2 minutes after manual massage has been started or is feeble, 0.2 cc. of 1:1,000 solution of epinephrine should be injected into the left ventricle. This dose may be repeated once only. Fifteen degrees of Trendelenburg position promotes the flow of oxygenated blood to the vital brain centers. Rapid blood transfusion into the aorta may be administered whenever excessive blood loss is a factor in the occurrence of the arrest.

CONCLUSIONS

Cardiac arrest is an unusual but ever-present danger in all surgical procedures. Promptness in diagnosis and initiation of therapy are paramount in decreasing mortality. Thoracotomy with cardiac massage can be performed by the average surgeon. Everyone who undertakes surgery should be indoctrinated in the treatment of this condition. Present-day antibiotics nullify the complications which formerly followed the unsterile technic necessary for the immediate application of this therapy.

BOOKS RECEIVED

The Roentgen Aspects of the Papilla and Ampulla of Vater, by *Maxwell H. Poppel,* M. D., F. A. C. R., Professor of Radiology, New York University Post-Graduate Medical School; Director of the Roentgen Ray Department, Bellevue Hospital; Consultant in Radiology, Veterans Administration Hospital, Bronx, N. Y.; Consulting Radiologist, United States Naval Hospital, St. Albans, Long Island; Roentgenologist, New York University Hospital; *Harold G. Jacobson,* M. D., F. A. C. R., Director, Department of Roentgenology, Hospital for Special Surgery; Associate Clinical Professor of Radiology, New York University Post-Graduate Medical School, New York, N. Y.; Attending in Radiology, U. S. Veterans Administration Hospital; Formerly, Chief, Radiology Service, U. S. Veterans Administration Hospital, Bronx, N. Y.; and *Robert W. Smith,* M. D., Senior Resident in Radiology, Veterans Administration Hospital, Bronx, N. Y. 195 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1953. Price $8.50.

United States Army in World War II. The Technical Services, The Quartermaster Corps: Organization, Supply, and Services, by *Erna Risch.* Vol. I. *Office of the Chief of Military History, Department of the Army,* Washington, D. C. 418 pages; illustrated. U. S. Government Printing Office, Washington, D. C., publishers, 1953. Price $3.25.

Gout and Gouty Arthritis, Modern Medical Monographs No. 7, by *John H. Talbott,* M. D., Professor of Medicine, The University of Buffalo School of Medicine; Physician-in-Chief, Buffalo General Hospital, Buffalo, N. Y. 92 pages; illustrated. Grune & Stratton, Inc., New York, N. Y., publishers, 1953. Price $4.

BILATERAL PAPILLEDEMA OF UNDETERMINED CAUSE(1)

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MOST cases of choked optic disk suggest a tentative diagnosis of space-occupying lesion such as neoplasm, abscess, or subdural hematoma. Other causes may be nonsuppurative encephalitis, arachnoiditis, and infection of a temporal bone (otitic hydrocephalus) or of the paranasal sinuses. An interesting, but unusual, group of patients with bilateral papilledema in whom the etiologic diagnosis was obscure has been encountered at this station. Similar series of cases have been reported by Bedell *(2)*, Leinfelder and Paul *(3)*, McKinney *(4)*, Yaskin et al. *(5)*, and Leinfelder *(6)*. All patients in the following case reports showed a definite papilledema as the main clinical finding and minimal or complete absence of general neurologic signs. The presence of normal visual acuity, the absence of any central or paracentral scotoma, and the lack of perivascular exudate ruled out a papillitis. The peripheral fields were found to be normal but the blind spots were enlarged. These findings would tend to indicate that the papilledema was due to increased intracranial pressure rather than inflammation of optic nerve fibers. This series is of particular interest in that these patients were seen within a period of 12 months at this station, and all made a spontaneous recovery following ventriculography.

CASE REPORTS

Case 1. A 25-year-old man was admitted on 1 March 1952 complaining of diplopia occurring once or twice a week of 1 year's duration. In the preceding 2 months this had been accompanied

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(1) U. S. Army Hospital, Camp Gordon, Ga.

(2) Bedell, A. J.: Papilledema without increased intracranial pressure. Am. J. Ophth. 25: 685-696, June 1942.

(3) Leinfelder, P. J., and Paul, W. D.: Papilledema in general diseases. Arch. Ophth. 28: 983-987, Dec. 1942.

(4) McKinney, J. W.: Papilledema of unknown etiology. Am. J. Ophth. 31: 866, 1948.

(5) Yaskin, J. C.; Groff, R. A.; and Shenkin, H. A.: Severe bilateral papilledema of indeterminate etiology with report of 12 cases. Confinia neurol. 9: 108-128, 1949.

(6) Leinfelder, P. J.: Choked disk and other types of edema of nerve head; comment on physiopathologic features. J. A. M. A. 144: 919-921, Nov. 11, 1950.

by episodes of twitching, numbness, and weakness of the right side of the face, and right-sided temporal headaches. Physical examination was negative except for papilledema of 1 diopter and slightly enlarged blind spots. Leukocyte counts ranged between 10,000 and 15,600 with normal differential counts. An angiogram of the carotid arteries was negative. On 2 April a ventriculogram was negative. On 12 May the disk edges were blurred, but no papilledema was present. He was discharged on 13 May improved.

Comment. A space-occupying lesion of the central nervous system was suspected, but no evidence was found. Papilledema was the only positive objective finding. The papilledema and symptoms cleared spontaneously.

Case 2. A 28-year-old woman was admitted on 7 July 1952 complaining of bifrontal headaches of 4 months' duration, with occasional blurring of vision, periods of confusion, nausea, vomiting, and low backache. Headaches originally started behind the right eye and gradually became bifrontal. Physical examination was negative except for the ocular and neurologic findings. There was bilateral papilledema of 2 or 3 diopters. Central fields revealed an enlarged right and slightly enlarged left blind spot, with normal peripheral fields. Unsustained bilateral nystagmus was present. The right arm was slightly weak and stiff. The finger-to-nose test showed the right finger constantly missing the nose. The leukocyte count was 13,700 with a normal differential count. On 22 July bilateral ventriculograms were negative. The papilledema decreased, the symptoms were improved, and the patient was discharged to her home on 28 July.

Comment. With the symptoms and signs of papilledema and other neurologic findings, a right frontal or cerebellar lobe tumor was suspected. All laboratory tests were negative, and because the findings improved, a diagnosis of papilledema without evidence of intracranial lesion (pseudotumor) was made.

Case 3. A 5-year-old girl was admitted on 21 April 1952 complaining of headaches of 4 weeks' duration. In February and March 1952, she had episodes of bilateral otitis media, with perforation of her drums accompanied by profuse discharge. Physical examination was negative except for ocular findings. There was bilateral papilledema of 2 diopters. The retinal veins were slightly engorged and a small hemorrhage was noted inferior and temporal to the right disk and nasal to the left disk. On 2 May ventriculograms were normal. The ventricular fluid contained 14 lymphocytes per cu. mm. and 11.5 mg. of protein per 100 cc. On 3 June the disks were flat, the edges still blurred, but the venules were less dilated and tortuous. The patient was discharged, improved, on 3 June.

Comment. With the history of previous otitis media, and the later findings of papilledema, a tentative diagnosis of otitic hydrocephalus was made. The papilledema cleared several days after ventriculography, and 9 months later there had been no recurrence.

Case 4. A 30-year-old woman was admitted on 16 April 1952 with generalized headaches of about 2 weeks' duration. On 13 September 1951 she had slipped and fallen, striking her occiput on a bare floor, and was momentarily unconscious. For 3 days following the fall she had headaches associated with drowsiness. On 2 April, she had developed severe bilateral frontoparietal headaches—worse when erect—associated with nausea and vomiting. Physical examination was negative except for ocular and neurologic findings. Her fundi revealed papilledema of 2 diopters, with blurred disk margins. Her peripheral visual fields were normal and her central fields showed slightly enlarged blind spots. The left side of her face was slightly more sensitive than the right, and the right side of her body was more sensitive to pin prick and cotton than the left. Her spinal fluid had 12 cells per cu. mm. (11 were neutrophils and 1 was a lymphocyte). A roentgenogram of the skull was negative. EEG revealed questionable right temporal focus. Ventriculograms were normal on 17 April and again on 12 May. The neurosurgeons noted increased intracranial pressure during the ventricular studies. On 29 April the facial flatness was gone. On 16 May there was no papilledema and the disk margins were almost clear. The patient was discharged on 23 May, improved.

Comment. In this case, the history was almost typical for a subdural hematoma. Clinical tests ruled out this and other space-occupying lesions. Papilledema, which was the main clinical finding, cleared following ventriculography.

Case 5. A 25-year-old man sustained a compound fracture of the right occipital bone with extension into the mastoid and laceration of the right ear drum in an automobile accident on 7 November 1951. He was admitted because of persistent frontal headache. Funduscopic examination on 16 November revealed bilateral papilledema with a small hemorrhage nasal to the left disk. Peripheral fields were normal, and the blind spots were 1.5 times the normal size. There was partial palsy of the right superior oblique muscles, probably accounting for the diplopia. Roentgenograms of the skull revealed a fracture line at the right temporal region. On 6 December ventriculograms were normal. The neurosurgeons noted increased intracranial pressure. On 13 December the diplopia and headaches had disappeared, and the papilledema had subsided. He was discharged to duty on 1 February 1952.

Comment. Because of the traumatic episode and the presence of bilateral papilledema, a subdural hemorrhage was considered likely, but the diagnosis was not substantiated. His condition improved markedly after ventriculography.

Case 6. A 22-year-old man was admitted on 27 June 1952 complaining of daily headaches of 3 years' duration. Occasionally the headaches were severe and not relieved by anything but sleep. There was a history of several head injuries received in parachute jumps. The first injury occurred 3 years prior to admission when he fell on his head while landing. Although he was wearing a helmet at the time he developed severe frontal and occipital headaches thereafter. His second injury occurred when he was struck in the nape of the neck with a "riser belt" as his parachute opened. There was a bilateral papilledema of from 1.5 to 3 diopters and blurring of the margins of the disks. The peripheral fields were normal and the central fields revealed the blind spots to be 1.5 times the normal size. On 12 August the spinal fluid pressure was 350 mm. of H_2O with the patient in the sitting position. A roentgenogram of the skull was negative. On 5 August a right angiogram was negative. On 12 August ventriculograms were normal. On 25 September the right disk was blurred but not elevated, and the left disk and blind spots had returned to normal.

Comment. With the history of the headaches and papilledema preceded by trauma to the head, a subdural hemorrhage was suspected. All tests were negative in localizing a space-occupying lesion. Spontaneous recovery occurred after ventriculography.

Case 7. A 27-year-old woman was first seen in the outpatient clinic complaining of bitemporal headaches of 9 days' duration. The headaches were slightly relieved by aspirin. Physical examination was negative except for the ocular findings. Drusen were present on the nasal portion of the right disk. The margins of both disks were blurred and there was a bilateral papilledema of from 1 to 3 diopters. The peripheral fields were normal, and the blind spots were 1.5 times the normal size. Because the papilledema persisted, the patient was admitted to the hospital on 16 October 1952. On 23 October ventriculograms were normal. The disk flattened and the margins became more distinct following this procedure. The blind spots became smaller in the following weeks and the patient's symptoms lessened. She was discharged on 12 November, improved. Slight blurring of the disk margins persisted.

Comment. Drusen may simulate papilledema, as described by Chamlin and Davidoff *(7)*, but because there was definite elevation of the disks bilaterally and the blind spots were enlarged, a diagnosis of papilledema was made. The disks gradually returned to normal following ventriculography and the drusen at the right disk remained. No definite cause of the papilledema was found.

DISCUSSION

All these patients exhibited a frank papilledema on admission, and ventriculograms were made on each. On discharge from the hospital none of the patients had papilledema, but 4 had blurring of the disk margins. Ventriculograms failed to reveal a causative agent in any of the patients.

The chief complaint of all these patients was headache. Three had a history of definite trauma. One had a history of otitis media preceding the onset of symptoms. Three exhibited visual disturbances. Two had minimal abnormal neurologic findings. All had a definite measurable papilledema, varying from 1 to 3 diopters on repeated examinations. Engorgement of the venules was present in 6 patients and hemorrhages were noted in 2. The peripheral visual field was normal, but the blind spot was enlarged from 1 to 2 times in all patients. Angiograms, performed on only 2 patients, were normal. Ventricular studies on all patients revealed increased intracranial pressure in 3 but no lesion in any. All patients made a spontaneous recovery following ventriculography. The papilledema disappeared, the blind spots returned to within normal limits, and subjective symptoms subsided.

Bilateral papilledema of undetermined cause has been discussed previously by many investigators. Brain tumor or some other space-occupying lesion should be suspected as the etiologic factor in all cases and must be ruled out. The 7 patients observed by us exhibited bilateral papilledema and enlarged blind spots but normal visual acuities and peripheral fields.

SUMMARY

In a group of patients in which bilateral papilledema and enlarged blind spots were prominent features, ventriculography failed to reveal a space-occupying lesion. Only 3 of the 7 patients exhibited increased intracranial pressure. Because no common factor was found in these cases and the symptoms subsided and the papilledema disappeared following ventricular studies, the cause of the papilledema remains obscure.

(7) Chamlin, M., and Davidoff, L. M.: Drusen of optic nerve simulating papilledema. J. Neurosurg. 7: 70-78, Jan. 1949.

BOOK REVIEW

Progress in Clinical Psychology, Volume I, edited by *Daniel Brower*, Ph. D., Director of Psychological Services, Personnel Laboratory, New York, N. Y.; Department of Psychology, City College, New York, N. Y., and *Lawrence E. Abt*, Ph. D., Director of Research, Biomechanics Division, Alderson Research Laboratories, New York, N. Y.; Consultant, Veterans Administration. 564 pages (in 2 sections), Grune & Stratton, Inc., New York, N. Y., publishers, 1952. Section 1, Price $5.75. Section 2, Price $5.

The editors with the able assistance of 38 contributors, many of whom are prominent authorities, have set themselves the task of reviewing and evaluating the literature during the period (1946 to 1951-52) subsequent to World War II. This book assays the present state of clinical psychologic investigations against a background of social, medical, and historical factors and attempts to evaluate them within the framework of general psychologic theory and methodology.

Progress in clinical psychology has not been made equally rapid in all directions. Trends in the development of any field of inquiry are often defined by omissions as well as by inclusions; by accentuation as well as by underemphasis. It is difficult indeed to forecast the directions of future clinical psychologic research. If subsequent investigations are to follow the major trends of the immendiate past as disclosed in this volume, the future looks dim and fruitless. Psychologists are slowly unlearning a lot about what clinical psychology teaches. This book helps immensely to point up the many weaknesses and the few strengths of the budding young science of clinical psychology. The editors plan to publish subsequent volumes every 2 years "in such a way that topics of importance, not included in this volume, can be examined fully and at the same time areas of vital interest already included can be more systematically handled because the period of coverage will be briefer."

This volume will be indispensable for the teacher, clinician, and research psychologist. The graduate student will welcome its abundant suggestions for thesis topics and dissertation problems. The research psychologist will supplement this book with the *Annual Review of Psychology* and appropriate issues of the *Review of Educational Research*. The volume offers an excellent but brief overview of the progress of clinical psychology during the postwar period. If the publishers had not forgotten the pocketbook of the consumer, they might have offered the two sections of this volume in one book with profit and savings to all concerned.—*Lt. Col. F. Killian, Jr., USAF (MSC)*

SQUAMOUS CELL CARCINOMA OF THE MAXILLARY SINUS[1]

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WILLIAM RAKOWER, *Lieutenant, junior grade, DC, USNR*

THE dentist may have an important role in the detection of a malignant growth in the mouth and biopsy may aid in the diagnosis of any abnormal condition in or about the mouth. Most carcinomas of the maxillary sinus occur in adults over 50 years of age, and usually result in death within 2 years of the diagnosis (2). Because of the size of the sinus within which the neoplasm grows, much time may pass before clinical symptoms become pronounced (3).

The first symptoms of this lesion may be a purulent or bloody nasal discharge, pressure or neuralgic pains in the sinus area, and bulging of the maxilla overlying the growth. Such patients may be first treated for pyorrhea, toothache, or simple sinusitis, depending on the location of the neoplasm within the sinus, and its size. The tumor may invade the orbit, nares, infratemporal, and pterygopalatine spaces. It may erode and break through the palatal as well as the buccal plates of bone. As bone destruction progresses and the tumor grows, a fungating mass may be seen at the opening of the sinus, on the bony wall of the nose, or in a tooth socket. The tumor's growth may thus result in the loosening of teeth in the area, trigeminal neuralgia, and exophthalmos. Invasion of the upper jaw by carcinoma of the maxillary sinus usually occurs intraorally in the region of the hard palate or in the socket of a tooth previously extracted for pain or looseness (2). This lesion is treated by electrosurgery followed by radiation therapy (2, 3).

CASE REPORT

A 37-year-old man about mid-August of 1952 first noticed some discomfort and a "blister" on the left side of his palate in the molar area. He was examined by a dentist at an Air Force Base about 1 September, and, the upper left second molar was removed. The "blister" did not disappear and 2 days later the upper left

(1) U. S. Army Hospital, Fort Dix, N. J.

(2) Geschickter, C. F., and Copeland, M. M.: Tumors of Bone. 3d edition. J. B. Lippincott Co., Philadelphia, Pa., 1949.

(3) Padgett, E. C.: Surgical Diseases of Mouth and Jaws. W. B. Saunders Co., Philadelphia, Pa., 1938.

first molar was removed. Following this extraction, the sockets apparently healed but the "blister" grew larger and about 2 weeks later, he again consulted his dentist. At this time an incision for drainage was made into the palatal swelling. On 8 October, the patient was sent to the ENT Clinic at Fort Dix for consultation and treatment and there a tentative diagnosis of acute left maxillary sinusitis was made. It was suggested that the sinus be irrigated through the natural opening at 2-day intervals.

The washings were purulent. No improvement occurred and on 20 October, the patient was hospitalized. His admission diagnosis was "Fistula, oral, of maxillary sinus and left maxillary sinusitis, acute." When he was seen in the dental clinic on 21 October, a large, bulging, fluctuant mass was present under the left palatal mucosa, causing an expansion of the palatal tissues. Also, fungating exuberant granulation tissue was extruding from the sockets of the extracted upper left molars. There was direct communication through this mass into the sinus. No cervical lymph nodes were palpable.

Roentgenograms of the left maxilla showed a marked cloudiness of the maxillary sinus, the presence of a sequestrum in the operative area, and a break in the sinus floor on the left in the molar area.

On 29 October, under general endotrachael anesthesia, the sinus was opened. A firm, foul-smelling, glandlike mass filled the sinus. It was thoroughly removed from the antrum and its walls. The palatal bone had been completely destroyed by the lesion. The posterior wall of the sinus was also destroyed, and the lesion extended into the soft tissue of the infratemporal and pterygopalatine fossas. An opening into the sinus was made through the lateral nasal wall and a nasal polyp was removed. The impression at operation was that this lesion was probably malignant.

On 3 November, the report of the biopsy was squamous cell carcinoma and the patient was transferred to Walter Reed Army Hospital for further treatment.

Although most of this lesion was removed by this operation, part of it undoubtedly remains, especially where it had destroyed the bone and invaded its surrounding soft tissue, and therefore the prognosis is poor.

DISCUSSION

In patients with malignant tumors, the earlier the diagnosis is made and treatment given, the better the prognosis. Evidently in this patient the tumor was present before his teeth were removed. The removal of his teeth pointed up a condition which might have progressed unrecognized even further if the teeth

had not been extracted. On the other hand, a biopsy specimen was not taken from this patient until about 2 months after the first tooth was removed, and until almost 3 months after he had the first sign of trouble. It is necessary to listen to and investigate all of a patient's complaints, even though the patient is a hypochondriacal or neurotic person. When a mass of tissue is seen in or near an extraction site and does not respond to conservative treatment within 10 days, it should be further investigated because it might be a malignant tumor.

CONCLUSION

Squamous cell carcinoma of the maxillary sinus is a type of malignancy which may be first seen and diagnosed by the dentist.

BOOKS RECEIVED

Physiological and Therapeutic Effects of Corticotropin (ACTH) and Cortisone, by *Dwight J. Ingle,* B. S., M. S., Ph. D., Senior Research Scientist (Physiologist), Research Laboratories, The Upjohn Company, Kalamazoo, Mich., and *Burton L. Baker,* B. A., M. S., Ph. D., Professor of Anatomy, University of Michigan Medical School, Ann Arbor, Mich. American Lecture Series, Publication No. 179, A Monograph in American Lectures in Metabolism, edited by *Paul György,* M. D., Department of Pediatrics, University of Pennsylvania School of Medicine, Philadelphia, Pa.; *Louis Leiter,* M. D., Division of Medicine, Montefiore Hospital, New York, N. Y.; and *S. O. Waife,* M. D., The Lilly Research Laboratories, Indianapolis, Ind. 172 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1953. Price $5.50.

Diseases of the Digestive System, edited by *Sidney A. Portis,* B. S., M. D., F. A. C. P., Associate Clinical Professor of Medicine, University of Illinois Medical School; Senior Attending Physician in the Department of Medicine, Michael Reese Hospital; Consulting Physician, Cook County Hospital; Member of Advisory Board of Institute of Psychoanalysis; Chief of the Medical Services of the Institute for Psychosomatic and Psychiatric Research and Training, Michael Reese Hospital, Chicago, Ill., with 57 Contributors. 3d edition, thoroughly revised. 1119 pages; 269 engravings and 5 color plates. Lea & Febiger, Philadelphia, Pa., publishers, 1953. Price $20.

Aviation Toxicology, An Introduction to the Subject and a Handbook of Data, Prepared under the direction of the *Committee on Aviation Toxicology, Aero Medical Association.* 120 pages; illustrated with graphs. The Blakiston Co., New York, N. Y., 1953. Price $4.

BOOK REVIEW

Renal Cortical Necrosis and the Kidney of Concealed Accidental Haemorrhage, by *H. L. Sheehan,* D. Sc., M. D., F. R. C. P., F. R. C. O. G., and *H. C. Moore,* M. D., Department of Pathology, University of Liverpool, England. American Lecture Series, Publication Number 167, A Monograph in The Bannerstone Division of American Lectures in Circulation, edited by *Irvine H. Page,* M. D., Cleveland Clinic, Cleveland, Ohio, and *A. C. Corcoran,* M. D., Cleveland Clinic, Cleveland, Ohio. 186 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1953. Price $7.75.

The book represents an attempt to establish, primarily on morphologic grounds, a somewhat intriguing concept of the pathogenesis of renal cortical necrosis and of some related earlier and lesser lesions of the kidney. The renal lesions of 67 patients who died of "uteroplacental apoplexy" (concealed accidental hemorrhage, abruptio placenta) are studied and the sequence of event interpreted by the authors. They mention that a large series of animal experiments, which are to be published elsewhere, were carried out and make no further reference to them. Although it is stated that their conclusions were reached on the study of the human material, it is difficult for one to arrive at similar conclusions on the basis of the material as presented.

Of the 67 cases, 28 autopsies were performed within 2 hours after death; 21, from 2 to 5 hours; and 18, after 5 hours. Attempting to eliminate postmortem degeneration and artefact, the authors stated that histologic sections of the delayed autopsies (assumed minimum 18 or maximum 37 cases) were used only to confirm evidence of renal pathology but a table, 2 pages later, tabulates all 67 cases as: (1) no lesions, 7 cases; (2) proteinuria and collecting tubule casts, 7 cases; (3) colloid degeneration of proximal tubules, 10 cases; (4) simple necrosis of proximal tubules, 9 cases; and (5) renal cortical necrosis, 34 cases. In groups 3 and 4 there is no evidence of gross pathologic changes and histologic studies are required, yet the 2 groups comprised a total of 19 cases. It is on this group of early lesions that the authors place a great deal of emphasis and unfortunately it is not evident, either in the text or in the photomicrographs, whether or not postmortem degeneration and fixation artefacts may be a major factor.

In reconstructing from their well-described morphology, the authors have based their concept on interpretations which may not be wholly justified and on an occasional statement of fact over which there still exists considerable difference of opinion. Good photographic material and some excellent detailed descriptions of the gross and microscopic pathology of renal cortical necrosis are presented. It represents another study of the etiology and pathogenesis of renal lesions and, for this reason, is recommended reading for those interested in renal pathology and physiology.—*Capt. G. R. Nicholson, MC, USA*

A PLAN FOR HANDLING ROUTINE PRENATAL VISITS

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THE following plan for the management of routine prenatal examinations may benefit patients and doctors in large obstetrical services, either military or civilian. I applied this plan in an Army hospital and believe that it is especially useful in overcoming some of the complaints of dependents concerning this type service. Because the intelligence of the average patient treated in the obstetrical services in the Army is higher than the intelligence of average patients treated in most large civilian free clinics, the teaching aspect of the plan should be more effective in Army clinics.

THE PLAN

The patient's first visit is handled in the customary manner. History, general physical examination, obstetrical measurements and routine laboratory examinations are completed. The patient is told to return in 1 month to one of the prenatal classes held regularly and to bring a urine specimen to each class. She reports to the class every 4 weeks from the time of the first visit until she reaches the last month of pregnancy. (During the last month, she is examined weekly in the obstetrical clinic.) The classes are held one afternoon a week so that one-fourth of the total monthly examinations are done each week. These consist of urinalysis and checking the weight, blood pressure, and progress notes for any unusual findings. A short talk is then given by a physician concerning some phase of pregnancy. Following the talk, there is a question and answer session in which all patients are urged to participate. After this, any patient requiring additional examination is sent to the clinic.

For an obstetrical service which delivered from 75 to 100 babies a month, the entire procedure required an average of 2 hours a week. The time was used as follows: 30 minutes for the routine checking of patients; 20 minutes for the talk; 40 minutes for questions; and 30 minutes to check patients who required further examination. For most patients the total time required was 1.5 hours. Three physicians were used in the routine check on patients (1.5 physician-hours). One physician talked and answered questions (1 physician-hour). Usually 1 physician

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did the additional examinations required (a maximum of 1 physician-hour). This makes a maximum of 3.5 physician-hours a week devoted to routine monthly checks.

Prior to the use of this plan, patients were examined individually. Three physicians were assigned, 2 days a week, to the clinic and required an average of 4 hours to complete the prenatal examinations (24 physician-hours).

The subjects discussed in the weekly talks were placed in 5 categories: (1) conception and problems of the first trimester, (2) problems of the second trimester, (3) problems of the third trimester, (4) labor and hospital stay, and (5) care of the newborn (given by the pediatrics staff). The series was repeated every 5 weeks. Because patients were instructed to return every 4 weeks, each patient heard a different talk each visit for 5 visits. Few patients were seen for more than 5 routine visits because most of them did not come in prior to the third month for the initial examination.

Questions from the patients were encouraged and not limited to the phase of pregnancy under discussion by the medical officer. Physicians were assigned to talk in rotation so the patients could hear and know all the staff. In each series a physician talked on a different subject so that he would not become stereotyped. Talks were kept short and simple so that patients would not become tired or confused. Visual aids were used whenever possible.

RESULTS

After this plan had been in effect for about 10 months, questionnaires were given to 103 patients to sample their reactions. All patients did not answer all questions so the number of answers to each question varied.

Is this your first pregnancy? If not how many children have you had? Twenty-seven were primiparas; 19 had 1 child; 29 had 2 children; 14 had 3; 6 had 4; 3 had 5; 4 had 6; and 1 had 9.

Do you like the class form of prenatal checkup better than the clinic form previously used? Fifty-seven answered yes and 15 answered no.

Were you benefited in any way by the classes? Seventy-three answered yes and 14 answered no.

Do you wish to continue the classes in their present form? Seventy-two answered yes and 9 answered no.

A space was left for comments with the following results: Five patients stated that they did not learn anything that they

did not already know. This will inevitably be true of some patients. Many of these same patients wished to continue the classes for other reasons. Two patients stated that this method took more of their time. For the average patient the time was less than that used previously waiting in the clinic. Six patients deplored the loss of "the personal touch." This was the most common complaint of patients being treated by medical officers in spite of the excellency of the treatment given. We hoped to lessen this difficulty by having the patients get to know all the staff and hear them discuss the patient's problems without being hurried. Under the old plan the patient might wait several hours to see a harried doctor for about 5 minutes.

One patient stated that she found difficulty in building up her confidence in anybody. This is another common complaint against Army medicine. Adequate treatment must include more than the management of the physical needs of the patient; it must give her confidence and peace of mind also. Because it is not possible to guarantee that a certain physician will deliver a given patient, we hoped to encourage the patients to develop confidence in the obstetrical service as a whole. I believe that the plan presented was more successful in this than was the old method. Three patients said they were embarrassed to ask questions in front of the assembled group. We were aware that this would be a problem and tried to overcome it by reminding patients that they were "all in the same boat." An additional aid was *not* to discourage those who stayed after class to ask personal questions. One patient complained that she did not get enough time to talk to the doctor when he checked her chart. Questions and discussion during checkup were discouraged, but patients were urged to ask questions after the talks.

Favorable comments were less broad in scope, but more numerous: 12 patients were glad to learn about themselves, their pregnancy, and care of the newborn; 6 evinced enthusiastic approval without giving reasons; 1 believed that this method gave a more personal contact with the physicians; and 4 liked the plan because it took less time.

Both from the material presented and from the personal comments of patients regarding this program, I believe it was well accepted by this group of Army patients and that it would be well accepted by most patients attending large obstetrical clinics.

SUMMARY

The plan presented helped to instill confidence in the prenatal patient for the obstetrical service and thus allayed many of her fears and uncertainties. These patients can be given the

same care with less loss of their time. The medical officer is spared much boring routine examination and has more time available for other duties. The classes help the physician to improve his knowledge of the physiology and minor complications of pregnancy. Furthermore, he learns to present medical subjects on the level of the layman. There is no better stimulus to learning than teaching.

BOOKS RECEIVED

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Human Blood Coagulation and its Disorders, by *Rosemary Biggs,* B. Sc. (Lond.), Ph. D. (Toronto), M. D. (Lond.), Graduate Assistant in the Department of Pathology, Radcliffe Infirmary, Oxford, and *R. G. Macfarlane,* M. A. (Oxon.), M. D. (Lond.), Clinical Pathologist to the Radcliffe Infirmary, Oxford; Radcliffe Lecturer in Haematology, University of Oxford. 406 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1953. Price $8.

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Modern Concepts of Leprosy, by *Harry L. Arnold,* Jr., M. D., F. A. C. P., Department of Dermatology, Straub Clinic, Honolulu, Hawaii; Contributing Editor, International Journal of Leprosy. American Lecture Series, Publication Number 145, A Monograph in American Lectures in Dermatology, edited by *Arthur C. Curtis,* M. D., Chairman, Department of Dermatology and Syphilology, University of Michigan, Ann Arbor, Mich. 105 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1953. Price $3.75.

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